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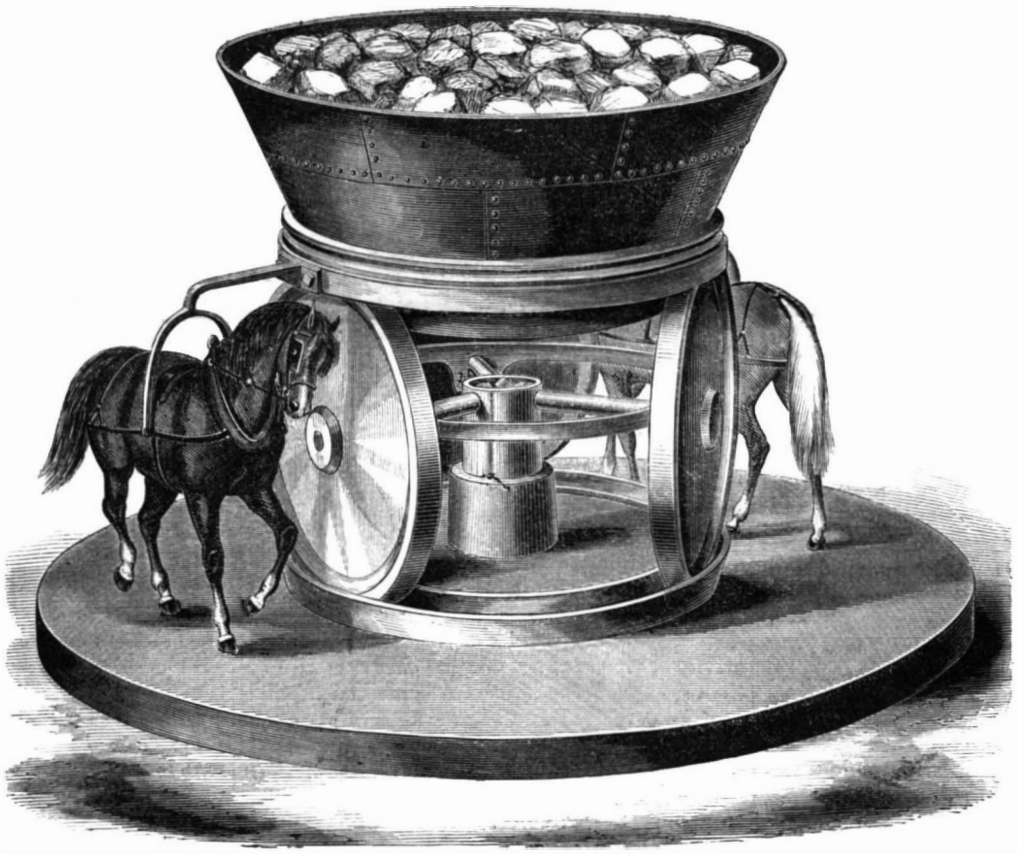
Improved Quartz Mill.

The following descriptive and discursive article is furnished by the proprietor of the machine herewith illustrated.

It may be said that the gold-bearing quartz mountains of this country are nearly equal in area to our coal fields and iron districts. In fact the quartz mountains are estimated by hundreds of square miles, and the quantity by millions of tuns, and no one can say when or where the deposits will cease. The quartz mountains, however, refuse to give up their rich treasure, until they are torn down by the slow but sure processes of machinery, and are not then available until subjected to pounding, grinding, crushing, washing and sifting processes, which are usually a source of loss. Scientific men and mechanics are constantly racking their brains for machines by which to overcome the enormous expense of reducing these "everlasting hills" to impalpable powder, for by no other agency can the fine particles of the precious metal be separated from the useless masses of stone which envelope them. There are certain well-known principles, understood by all practical miners, with regard to the treatment of quartz. Perhaps the first machine ever invented to grind quartz combines the very principles required in a higher degree than any modern invention; that is—not only a crushing power, but a certain amount of grinding and scouring motion is also required, in order to produce the largest yield; and this machine is a simple wheel, traveling round in an annular trough, turning on, or driven by its axle, and operated by animal power, making what is known in this country as the Chilian mill. This effects a gain of fifty per cent in time, but there is a corresponding loss of power. Practical miners who have used them, say that the Chilian mill will give a better yield of gold from a tun of quartz than any modern machine. The only objection is that it is too slow for this age; so a system is now in vogue to half pulverize a larger quantity of quartz, and leave half or two-thirds the gold in the tailings.

It is usual for each wheel in the Chilian mill to weigh about three tuns; this not being sufficient to crush the quartz in once passing over it, it must of necessity travel over the same path repeatedly before the quartz is all pulverized, and herein is the great loss of time. If the wheels were heavy enough to crush the quartz in one revolution, a great saving would be made. A third wheel is therefore added to this most primitive of all mills, and a much more thorough and complete pulverization is the result. The load or crushing power is placed upon the top of the wheels, which are driven from their peripheries instead of from their centers, as in all cases heretofore, giving a great increase of crushing power, without requiring additional mechanical power to move them; thus converting one of the most simple and primitive machines, into one of the most powerful character.

The inventor feels confident that he can crush as much quartz, or at least produce as much gold, per day with two horses as can be done with a battery of six stamps and a ten-horse power engine. Though the main object of the mill is for crushing quartz, the principle of it is applicable to various other kinds of work, where grinding or crushing is required. Our artist has succeeded in making the cut so plain that it requires no special reference to be understood, when it is stated that the design is to use crushing wheels at least seven feet in diameter, revolving in a track not exceeding six feet in diameter. And though it is particularly adapted to animal power, steam or water may be as readily used, by attaching a round belt (as shown) to the V-shaped groove immediately under the hopper containing the load. This mill was patented on Sept. 29, 1863; for further information address A. Hitchcock, 84 Beaver street, New York.



IMPROVED QUARTZ MILL.

ANNEALED LAMP CHIMNEYS.

A source of great expense and trouble to those who burn petroleum is the glass chimneys of the lamps. The term "brittle as glass" may be truly applied to them. They really appear to be manufactured for the purpose of being easily broken, so as to increase the demand for them upon their makers. It would be for the interest of dealers in petroleum to attend to this subject, as the great brittleness of these chimneys is due to their not being annealed. It would add but little to their original cost to anneal them properly, but would add much to the economical side of the question on the part of those who use them. As the case now stands, they are blown, and sent forth to market, tender as mushrooms, and just as long-lived.

Magic Lantern Slides.

As a great deal of interest is at present manifesting itself in the use of photographic transparencies in connection with the magic lantern, and as transparent positives made by means of the ordinary wet collodion process do not seem to be of a character well suited to this purpose, it has occurred to me to suggest one or two dry processes which, in my hands, have produced transparencies suited to it excellently, in my opinion. The first is a process which has long been described in the journals, but which, as far as my experience extends, has never met with the favor it merits. It is as follows:—Take any good working bromo-iodized collodion, sensitize in the ordinary acetic acid silver bath, and wash well after removal from it. Then flow over it a three-grain solution of chloride of ammonium, say for one minute, and wash well again. Finally, flow upon it, for the same length of time, a two-grain of freshly dissolved gallic acid, rinse off and dry. Expose in contact with a negative and develope with pyro. and silver in the ordinary manner.

Another process, that is characterized by great quickness and ease of development, consists in making use of the ordinary fifteen-grain tannin solution preservative merely modified by the addition of three drops of the purest glycerine to the ounce.

I have made positives by this latter process hardly distinguishable from albumen. The plates prepared in this manner I have found excellent for negatives, being more sensitive and giving more detail in the shadows than the ordinary tannin plates.—*H. T. Anthony.*

KEEP BUSY.—Men who have half a dozen irons in the fire are not the ones to go crazy. It is the man of voluntary or compelled leisure who mopes, and pines, and thinks himself into the madhouse or the grave. Motion is all Nature's law. Action is man's salvation, physical and mental. And yet, nine out of ten are wistfully looking forward to the coveted hour when they shall have leisure to do nothing, or something, only if they feel like it—the very siren that has lured to death many a "successful" man. He only is truly wise who lays himself out to work till life's latest hour, and that is the man who will live the longest, and will live to most purpose.

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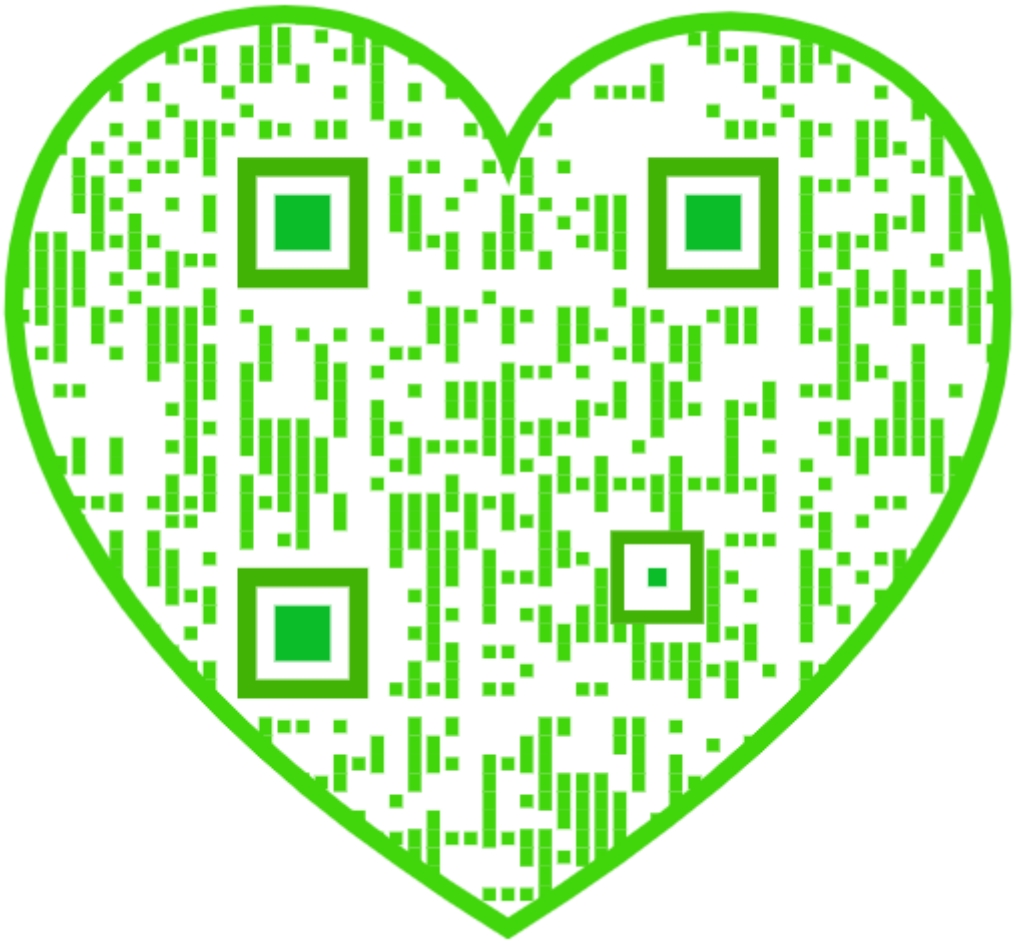

MANUFACTURE OF PARAFFINE IN SCOTLAND

The London *Ironmonger* contains a communication (which we condense) on the manufacture of paraffine, at Bathgate, Scotland, the most extensive of the kind in the world. The works were established by James Young, the patentee of the process for manufacturing oil for commercial purposes from coal, and to whose success we are indebted for the introduction of coal oil, and petroleum—the latter being purified for use by the coal oil process. Bathgate is situated on the field of the celebrated Boghead coal—a rich cannel—and was commenced about twelve years ago, upon a very small scale; but since then it has developed with an immense charcoal establishment, the works covering an area of twenty-five acres of ground, and giving employment to 600 men. The coal used is first broken into small pieces by a machine like an anthracite coal crusher, and is then ready for the retorts. These are arranged vertically in sets of four, each being eleven feet in hight, and the coal is raised to a platform near their top. Their upper ends, which project above the platform, are each closed by a conical hopper; the opening of the hopper into the retort is closed by a spherical valve, which is suspended in the retort and pulled up against the opening by a chain worked by a counterpoise. This simple contrivance is rendered sufficiently air tight by a handful of sand being thrown into the hopper. When it is wished to re charge the retort, the workman fills the hopper with the broken coal, and then depressing the iron chain, lowers the spherical valve, when the contents of the hopper fall into the retort, the opening being immediately closed again and luted by a fresh handful of sand. From the construction of the retort, the coal is gradually heated as it descends to that part of it which passes through the furnace.

The bottoms of the upright retorts pass completely through the furnaces, and are closed below by dipping into shallow pools of water, that form air-tight joints. The advantage of this arrangement is evident; the spent coal from which the oil has been driven off, as it passes through the hot part of the retort gradually descends into the water, and is from time to time raked away below, the coal from above descending as it is removed. Thus the action of these retorts is continuous, and the distillation goes on uninterruptedly both night and day. The waste refuse or spent coal from the retorts consists of about one-half carbon, the remainder being mineral matter. As it is not well adapted for fuel nor utilized in any way, it accumulates in enormous mounds that cover several acres near the works. The vapors which are produced in the retorts are all conducted by iron tubes to the main condensers. These, like the ordinary condensers in coal-gas works consist of a series of iron syphon pipes freely exposed to the air. In passing through these pipes the vapors condense into liquid, a very inconsiderable portion escaping into a gas-holder as incondensible gas.

In gas-works, a high temperature resolves the coal into incondensible gas and coal tar, the latter being a liquid heavier than water. In the Paraffine Works a comparatively low temperature, gradually applied, furnishes an inflammable oil lighter than water, with so small a portion of incondensible gas that practically it is of little consideration.

The crude oil produced in the numerous stacks of furnaces by the distillation of the Boghead coal is conveyed by means of iron pipes to a general reservoir: this is a brick tank sunk in the ground, and capable of containing 40,000 gallons. This crude oil is a mixture of various substances, some of which are very volatile, and give off inflammable vapors even at the ordinary temperature of the atmosphere. This tank is perfectly gas-tight, and is thus guarded against fire, while the refined oil is kept in circular iron tanks, each capable of holding 100,000 gallons, and sometimes one million of gallons are kept on the premises.

The crude oil as first obtained from the coal is a dark-colored thick liquid, containing all the products of its distillation. The first process of purification it undergoes is simple distillation. This is performed in cylindrical iron stills of enormous size; in these it is distilled to dryness, the superabundant carbon that it contains being left in the form of a shining black coke. As it is necessary to clear out this coke after each distillation, the retorts are made to open at the ends, so as to admit of its removal. This coke is employed as fuel. The vapor arising from these stills is cooled by being conducted along iron pipes passing through large open tanks sunk in the ground. These tanks have a very small stream of water flowing through them.

When the first purification by simple distillation has been effected, the oil is further purified by being acted on by strong oil of vitriol, or sulphuric acid The Bathgate Works include a complete apparatus for its manufacture: there are furnaces in which large quantities of sulphur are burned; vast leaden chambers, in which the fumes, mixed with those arising from aquafortis, are condensed into the liquid acid; and huge glass evaporating pans bedded in sand, in which the produce is concentrated by heat until it attains the required specific gravity of 1 848. In order to insure an adequate mixture of the paraffine oil and the sulphuric acid required to purify it, both are allowed to flow in the requisite proportions into circular tanks. Each of these contains a revolving stirrer, which throws the whole into great commotion, and causes the intimate mixture of the two liquids, spite of their different specific gravities, the acid being double the weight of the oil. This admixture is continued for about four hours, when the combined fluids assume a beautiful opaque green appearance. On being allowed to rest, the impurities which are charred and separated by the action of the oil of vitriol, subside to the bottom in the form of a dense, black, heavy acid tar. As this is not turned to any practical use, it is requisite to get rid of it in some way, as it cannot be allowed to pollute the neighboring streams, and its accumulation would be very inconvenient: it is necesary, therefore, to boil it to dryness, when the solid residue is used as fuel In order to separate the remaining impurities and that portion of the sulphuric acid which is left in the paraffine oil, it is next subjected to the action of a strong solution of caustic soda. This chemical reagent is also prepared at the works, a regular soda factory being in constant operation. This soda is rendered caustic by quicklime; and after having been used to purify the oil, is again worked up and re used over and over again.

As thus purified, the oil contains four distinct commercial products, which require to be separated from each other in order that each should be made available for useful and economical purposes. To effect this separation, the oil is again distilled. The first elevation of temperature drives over the lighter and more volatile portions; these are collected separately, and when purified by a subsequent distillation, yield on condensation the fluid known as naphtha. This naphtha differs essentially from that obtained from coal tar; the paraffine naphtha having a specific gravity of .750, whereas that procured from coal tar has a specific gravity of .850. The paraffine naphtha is of great value as a substitute for turpentine. It is also largely used to those naptha lamps in which the fluid descends down a long pipe from an elevated reservoir, and being converted into vapor by passing through the heated burner, jets out into a star-like flame. These lamps, from not requiring a glass, not being extinguished by a powerful current of air, are much employed by costermongers, and workmen in railway tunnels.

From its great volatility the naphtha does not require for its evaporation the heat of an open fire; it is therefore finally distilled in a separate house devoted to the purpose, the heat being furnished by the steam from a boiler situated outside the building. On the perfect separation of the lighter and more volatile naphtha depends the safety of the burning oil.

The burning or paraffine oil, which is the next product in point of volatility, comes over at a considerably higher temperature than the naphtha. The third product in point of volatility is the heavy oil used for lubricating. As originally obtained, the lubricating oil contains dissolved in it a very considerable proportion of solid paraffine.

In order to cause the cystallization of this paraffine from the heavy oils, a low temperature is requisite As this occurs naturally only in winter, during the greater part of the year an artificial refrigerating apparatus became indispensable. Formerly a machine acting by means of ether was employed; but that has been entirely superseded by a most beautiful refrigerating instrument invented by Mr. Kirk, the resident engineer of the works. By this contrivance the necessity of employing expensive volatile liquids is entirely obviated, their place being supplied by atmospheric air. It is difficult to say which is most to be admired—the theoretical perfection or the practical efficacy of this instrument. By the action of a piston working in an ordinary cylinder, a quantity of air is suddenly and forcibly compressed in a separate vessel. By this compression, the latent heat of the air is forced out, and its temperature instantaneously becomes very highly raised. The heat of the air, however, is rapidly abstracted by contact with the sides of the cavity, which are kept cold by a stream of water. The compressed air so cooled is then passed to the other extremity of the containing vessel, and permitted to expand. In doing this it takes in an equal amount of heat to that which it had lost by condensation; and it abstracts this amount from the surrounding objects, cooling with great rapidity a stream of brine which flows through channels in the vessel. This stream of brine, which is much colder than freezing water, is employed to lower the temperature of the heavy oils down to that point at which the paraffine crystallizes out This refrigerating engine produces a cooling effect equivalent to two tuns of ice every twenty-four hours with a very small expenditure of fuel. The heavy oils containing the frozen paraffine are next put into bags when the oil drains away, leaving the solid paraffine. It is difficult to imagine any more beautiful substance than paraffine: in its liquid state it runs like water, looking brighter and more transparent than the neighboring trout-streams. In a solid form it is the most elegant of all the substances used for making candles; whilst in its illuminating power it surpasses even spermaceti itself—eighteen pounds and a half of paraffine candles giving the same amount of light as twenty-three pounds of sperm, twenty six of wax, twenty-nine of composite, and thirty-six of ordinary tallow. A small piece of paraffine added to starch will be found to give a gloss and brilliancy of surface to the starched linen that can be attained by no other addition. From the greater resistance of casks than of metallic vessels to accidental violence in transit, the former are obviously the best means of insuring its safe conveyance; but the diffusive power of the oil is so great that it readily penetrates through the joinings of the staves. This inconvenience has been met in a very ingenious manner; each cask receives a coating of glue internally; this renders it quite impervious to the oil, so that the casks when in the possession of the retailer may be stored without the loss and annoyance of leakage. The cooperage attached to the works is a large and extensive organization: not only are the casks made and glued, but there is a distinct department where those returned to the works are cleaned and re-glued; and there is even a machine for the purpose of scrubbing the exterior of each, so that on its re-issue it goes forth in a clean form that is not objectionable in any warehouse in which it may be located.

Removing Ink from Photographs.

A correspondent of *Humphrey's Photographic Journal* says that recently he had the misfortune to deluge the photograph of a deceased child with ink, and asks the editor of the above periodical for some recipe to effect its removal. Whereupon the sympathizing editor sends the following formula and advice. Our readers may find it useful in similar cases:—

"Make the following solution:—Oxalic acid, 1 drachm; warm water, 1 ounce. Dissolve and keep at a temperature of about 100° Fah. Pour water of the same temperature over the photograph several times, until the paper becomes thoroughly saturated and moistened. Next flow it with the above solution and rub it gently with a clean camel's hair pencil. The ink will gradually disappear: and as it disappears, repeat the operation of washing with lukewarm water, and again flow with the acid. With patience and perseverance you will finally have the ineffable pleasure of seeing your dear 'little Charlie' once more. As soon as the picture has been thoroughly restored and the whites are perfectly bleached, wash very carefully in several waters so as to remove every trace of the acid or the salt which it

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formed, which, if left, might produce iron-molds. Our trouble in thus communicating with you will be abundantly remunerated by your success."

Soldiers Furnished by the Different States.

The following table is from the *Army and Navy Journal* :—

"Below we give a tabular statement of the number of troops voluntarily raised by the loyal States from the commencement of the war to January 1st, 1863. The table is prepared from official reports, and is as complete as it is possible to make it. The information furnished by some of the reports is so obscure that it is very difficult to decide to which class of service the troops furnished belong, but it is believed the classification is correct :—

	3 mos.	9 mos.	def'nce of State.	3 years.	Total.
Maine	779	7,493	262	24,771	33,105
New Hampshire	800	2,023		14,915	17,738
Vermont	782	4,777		13,447	19,006
Massachusetts	3,736	16,896		50,406	71,038
Rhode Island	3,147	2,069		9,410	14,626
Connecticut	2,340	5,697		20,182	28,219
New York	15,922			176,783	222,836
New Jersey	3,105	10,714		16,395	30,214
Pennsylvania	20,979	15,100		164,257	200,336
Ohio	26,893			143,228	170,121
Indiana	4,698		3,191	93,840	104,316
Illinois	4,901			130,539	135,440
Michigan	780			44,890	45,670
Wisconsin	810	491		39,345	40,646
Minnesota	930	1,200		10,136	12,266
Iowa	959			47,855	48,814
Missouri			10,540	27,407	37,947
Kentucky		878	1,860	41,163	43,908
Delaware	No returns				
Maryland					
Virginia					
Tennessee					
California					
	91,561	67,335	15,863	1,068,769	1,276,246

Canada Furs.

On this subject the Montreal *Herald* says :—"Owing to the low state of water on the upper Mississippi and Missouri, the largest part of the American collection of buffalo skins did not reach market this season, and the Hudson's Bay Company, by some cause or other, has not brought forward its usual collections. From these causes buffalo robes have run up to an unheard-of price in New York, the whole market being monopolized by one party. No. 1 are held there to-day at thirteen dollars instead of six dollars. The Canadian market, therefore, cannot be supplied from that source, and only the remaining skins of last year's collection are on our market, which sell from 7½@8½ per robe. The sale of manufactured furs has been unusually brisk both for Upper and Lower Canada, and the manufacturers feel badly the want of sufficient brands, the stock on hand begins to show that assortment gives out ; opossum fur is still the leading article for the Upper Canada trade, and Persian lamb and otter for Lower Canada."

MISCELLANEOUS SUMMARY.

Postage Stamps.—The cheapest postage stamp is the French, at one centime, and the dearest is that for the horse-post of California, which costs four dollars (21 francs). The best engraved of all the stamps are those of France, Greece, and particularly that of New Caledonia, which merits the first place. The ugliest are those of Belgium and the English, at one penny. The largest are those of Siberia, and the smallest those of Mecklenburg-Schwerin, which bears the head of an ox.

The *Commercial Bulletin*, Boston, states that the Putnam Machine Company of Fitchburg, Mass., have contracted for the manufacture of the heavy guns for the coast defense of the State, and are erecting buildings and machinery. A portion of the guns will be of the Blakeley pattern, weighing from 20 to 30 tuns each, and all of them will be rifled, and are designed to throw a projectile weighing from three to six hundred pounds.

Copper Coins.—In England the copper coinage is rapidly being superseded by the new bronze coin. About $750,000 of copper coins were in circulation, but about $400,000 has been recently returned to the mint. It is intended shortly to declare the copper money an illegal tender.

The domes of the Exhibition building of 1862 have been removed to the Alexandra Park, Wood Green, Hornsey, where they will be erected as soon as the preparatory works can be completed.

The Coal Trade.—The Philadelphia *Ledger* says : "Everything connected with the coal trade prospers wonderfully. With the increased price of coal, and its greatly increased production, this could scarcely be otherwise. The total net profits of the Reading Railroad for ten months, amount to the enormous aggregate of $2,351,173, and for the year will probably reach three millions of dollars! The coal crop of the State this year we have heard valued at fifty millions of dollars.

[It would be strange if some one didn't prosper with coal at $10 per tun.—Eds.

The Prince of Wales is tolerably comfortable for a young man just commencing the world. One million dollars of the accumulation of his Cornwall estate has been paid for an estate in Norfolk ; two millions and a half remain as a balance with his banker, and he has besides an income of $125,000 a year from his landed property, with $500,000 voted by Parliament, while his mother lives, and $250,000 pin money for his bride. A young gentleman, with no present family, may manage to keep house very comfortably on this amount, and not deny himself any of the usual comforts of a household.

The Philadelphia *News* says :—"Everybody is afraid to buy coal by the cargo. Holders pretend it will further advance. Consumers believe this to be humbug, and are holding off in hope of a decline. The article can be bought now about as cheap by the tun as by the cargo. The miners are fighting for five dollars a tun at the mines. This would be equivalent to $5 50 in the city. At wholesale, coal now brings $8 per tun. They receive at the mines long weight, 2240 pounds per tun. Shippers always buy in this way. The price of coal cannot now fairly be quoted. The market is intensely out of joint."

A large and spirited lithograph of the iron-clad *Roanoke* has just been issued by Mr. T. Bonar, of 124 Nassau street. The picture is exact in detail, and is much better, as a work of art, than the average of such enterprizes. The lithographs are sold at a low price, and we hope the artist will try his skill on the others of our iron-clad fleet, so soon as they are far enough advanced for the purpose.

A locomotive engine will carry 200 tuns at a cost of fuel scarcely exceeding the cost of corn and hay which a pack mule consumed, before the locomotive was invented, in conveying a load of three hundred weight an equal distance. The same difference of cost would be saved the community by using steam engines upon city railroads instead of horses, and every saving of cost is so much capital set free to employ more labor, and add to the general accumulation of wealth.

The power developed by a small vertical engine having a cylinder of 8 inches diameter, and 18 inches stroke of piston, a mean velocity of piston equal to 120 feet per minute, under a pressure of steam (mean effective on the piston) of 51 pounds above the atmosphere, cutting off at a little over 5 inches from the commencement of stroke, is equal to that of 10 horses, by the indicator.

M du Chaillu has sailed for Africa in the *Mentor*. He takes with him a set of photographic instruments and chemicals, having prepared himself for his expedition by learning the art of photography under Mr. H. Claudet. With a series of *cartes de visite* to vouch for his gorilla acquaintance, M. du Chaillu will be able to bid defiance to his detractors.

A curious observation respecting the rapidity of eagles in their flight has just been made by a traveler crossing the Grison alps. An eagle, in flying from one mountain peak to another, at a hight of 8,000 or 9,000 feet, performed the distance of five miles in five minutes.

India rubber can be dissolved by several substances which evaporate and leave it in a solid condition. Naphtha, turpentine, and benzole are solvents, but the latter is preferable on account of it having a more pleasant odor than the other two.

The plan of tightening the ends of condenser tubes, illustrated on page 280 (current volume) of the Scientific American, was patented in 1838, or earlier, by Samuel Hall, of England.

Our National debt at present amounts to $1,222,750,000.

Atlantic and Great Western Railroad.—The laying of the outside rails upon the Cleveland and Mahoning railroad for the use of the wide gage cars has been completed, and the Atlantic and Great Western has taken possession of the road. In a short time the broad gage will run into Cleveland, Ohio.

Prof. McCulloh, late of Columbia College, New York, has been made brigadier-general by Jeff. Davis, and is furnishing the rebels with a new artillery powder of his invention.

One ounce of pulverized borax put into one quart of boiling water, and bottled for use, will be found invaluable for removing grease spots from woolen goods.

A writer in the London *Photographic News* says that important improvements have been made in the art of photographing on wood for engraving purposes.

NEW YORK MARKETS

FOR THE FIRST WEEK OF NOVEMBER, 1863.

Bread.—Pilot, navy, and crackers, 4½c. to 8c. per lb.

Candles—Adamantine, sperm, and stearic, 19c. to 45c. per lb.

Coal.—Anthracite, nut, and egg size, $10 to $11 per 2,000 lbs.

Coffee.—St. Domingo and Java, 22c. to 40c. per lb.

Copper.—Sheathing and ingot, 30c. to 40c. per lb.

Cordage.—Manilla, American, and Russian, 17c. to 20c. per lb.

Cotton.—Ordinary, Middling fair, 78c. to 92c. per lb.

Domestic Goods.—Sheetings, 29c. to 40c. per yard; drills, 38c. to 41c. shirtings, 28c. to 43c ; stripes, 32c. to 42½c.; ticks, 25c. to 65c. prints, 20c. to 23c.; ginghams, 21c. to 27c.; cotton flannels, 39c. to 46c.; cassimeres, $1 25 to $2 50; woolen flannels, 47c. to 70c.; satinets, 50c. to 80c.; woolen cloth, $1 25 to $10.

Flax.—From 16c. to 18c. per lb.

Flour and Meal, $5 60 to $11 25 per barrel; rye, $5 to $5 50; corn $4 40 to $5.

Grain.—Wheat, $1 30 to $1 95 per bushel; oats, 82c. to 85c.; corn $1 05 to $1 10.

Gunpowder.—Blasting and rifle, 16c. to 28c. per lb.

Hemp.—American, $140 to $270 per tun.

Hops, 20c. to 28c. per lb.

Iron.—Scotch pig, $42 to $43 per tun; American, $39; Bar—Swedes, $125; English, $100 to $105; Sheet—Russia, 17c. to 18c. per lb.; English, 6¾c. to 7½c.

Lead.—Galena, $9 25 per 100 lbs.; pipe and sheet, 12c. per lb.

Leather.—Oak-tanned sole-leather, 39c. to 46c. per lb.; sole hemlock 27c. to 32c. per lb.

Lumber.—Spruce board, $17 to $21 per 1,000 feet; white oak plank, $35 to $40; white oak staves, $50 to $135.

Molasses.—From 41c. to 65c. per gallon.

Naval Stores.—Turpentine spirits, $3 05 to $3 15c per gallon; rosin, $40 to $48 per barrel of 280 lbs.

Oils.—Linseed, $1 40 per gallon; sperm, $1 90 to $2; crude petroleum, 29c. to 30c.; refined petroleum, 55c. to 56c.

Silk—$6 25 to $12 per lb.

Spelter. 8⅝c. per lb.

Steel.—English, 20c. to 29c. per lb.; English spring, 8c. to 15c.; American spring, 6c. to 7c.; German, 10c. to 17c.; English blister, 12c. to 21c.; American blister, 5½c. to 6½c.

Sugar.—Brown, 11c. to 15c. per lb.; white, 15¼c. to 16¼c.

Tea.—From 48c. to $1 40 per lb.—20 cents duty.

Tin.—Banca, 55c. per lb.; English, 42½c.; plates, $9 25 to $13 per box.

Tobacco.—Connecticut fillers and wrappers, 20c. to 45c. per lb. Ohio fillers and wrappers, 15c. to 30c.; Cuba fillers and wrappers, 90c. to $2.

Wool.—American Saxony fleece, 75c. to 90c. per lb.; Merino, 70c. to 73c.; California (unwashed), 25c. to 50c.

Since our last table was published on the first week of last month, there has been a great rise in the price of the most necessary articles of common life. Coal, which in our cities is as necessary to all classes during winter as food, has advanced about two dollars per tun. Coffee has gone up three cents per pound : and domestic cotton goods five cents per yard upon an average. The lower grades of flour have advanced about seventy cents per barrel, the prime qualities $1 75. Pig iron has advanced about two dollars per tun, English bar about three dollars, and sheet one cent per pound. Leather is up two cents per pound; lumber two dollars per 1,000 feet; and oils about twenty cents per gallon, with the exception of petroleum, which has fallen—"solitary and alone"—about five cents per gallon. There has been a slight advance on tin; on wool a heavy advance of five cents per pound. There is considerable fluctuation, however, weekly, caused by the unsettled state of the gold market.

Carrying Trade.—The freighting business is very active at present; railroads and steamboats are taxed to their utmost carrying capacity and yet cannot prevent an accumulation of freights at all the depots. Throughout the West there is a great degree of prosperity; confidence in the national currency has infused a life and spirit into trading operations, unknown before in the history of the commonwealth. Our Ocean commerce however has greatly declined owing to the high rate of war risk insurance. The carrying trade in American vessels is only one-third that of what it was before the war commenced. But we know that the loss to American shippers is more apparent than real; for although a very great number of American built vessels have received British charters, American merchants are still shareholders to a large extent and enjoy the profits of the business.

Cotton.—It is really a puzzle to account for the supplies of cotton. No doubt the quantity is much diminished, still the supply is very great. Thus the sales at Liverpool for the week ending Oct. 23d, amounted to no less than 101,500 bales, including 15,000 to exporters. The stock in port was 178,000 bales, including 38,000 American, and the price of New Orleans was 29½ pence per pound. The import to the United States for the month of October was 14,800 bales.

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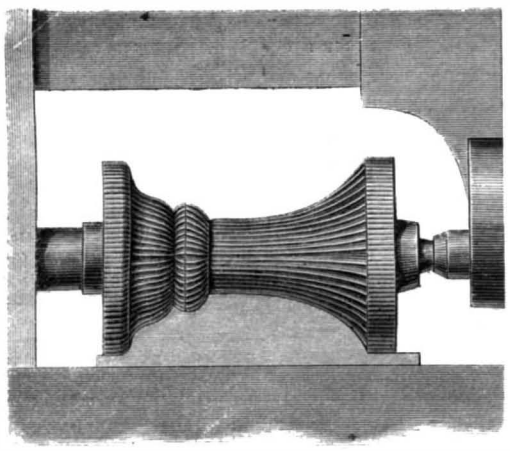
HOW A RIFLED MUSKET IS MADE AT THE PROVIDENCE TOOL COMPANY'S ARMORY.

[Concluded from page 294.]

Milling machines have been in use for a long time in gun shops, but through recent improvements made by the Providence Tool Company, they are enabled to give the work great dispatch—the machine being more easily adjusted and regulated and far more accurately set than elsewhere. On one of these machines we saw the operation of milling around the cone seat. As every one may not know what a "mill" is in technical phrase, we present herewith a cut of one; these are made of various shapes and do the work rapidly and accurately; being fastened upon a revolving shaft, as they turn they present a series of sharp angles or cutters which eat away the tough metal as quickly as one would cut old cheese.



The lumps of iron are thus quickly trimmed off and the barrel begins to assume shape and form. In all these operations, as in every other, the workman is guided by an arbitrary model or "former" which cannot err providing it is once made correct, and each part is tested several times as it proceeds toward completion; the workman being controlled by the certainty that he will lose not only the value of his own time but that of others whose labor would be lost if he made a mistake. Of course flaws in the material are not charged to him. We shall have occasion to see the milling machine again, hereafter, so we will depart from this shop and go into the grind ing room, where there are two huge stones which revolve with great rapidity. They are all boxed in so that the water which trickles on them cannot fly about; the stones run toward the grinder. This person has a crank, one end of which he inserts into the barrel, and then places the barrel itself into a recess prepared for it near the stone; he brings his work into contact with the stone by leaning against a lever behind him, and as portions of the surface are cut away the barrel is evenly ground; from time to time the workman applies a gage to the barrel, so that he may not reduce it too much, and when done it is laid on one side to be carried to the proving house. This building is a strong wooden structure, about ten feet square, containing no furniture beyond a cast-iron bed or frame and a bank of clay. The cast-iron bed alluded to has grooves in it like a washboard which will contain 32 barrels at once; these barrels are loaded with a quadruple charge (the service charge being 64 grains) and a ball of double the regulation weight. The barrels are inclined downward, and the muzzles converge, so that they will deliver their contents within a small compass; a long train of powder is laid communicating with the vent in the barrel on the one hand, and leading to a tube connecting with a musket lock and nipple on the outside. The response from within is perfectly tremendous, and requires the peculiar talent of an army correspondent to describe it; to our imagination it seems, at this distance, more like the roar of ten thousand hungry lions raging for their prey, than anything else we can think of. After the explosion the barrels are carefully examined, and if injured are condemned: the cause of the defect being readily ascertained and charged to the account of the defaulting workman. We were informed that the barrel-rolling branch of musket making at the Providence Armory is acknowledged by every one to be the best in the country. Not one in a thousand ever bursts, and large orders are constantly being executed for other armories throughout the State. On some rare occasions the charges are octupled, or eight times sixty-four grains; this is 6 dwts. over one ounce Troy; the balls are also quadrupled in weight, but even with these excessive tests the barrels come out of the ordeal unharmed. It must be borne in mind that these latter charges are only occasionally used, and not as a general rule. After being tried under fire at the proving house the barrels are ready to receive the finishing processes, and to this end they are rifled, polished, filed, trimmed up, &c. The cone seat we have seen trimmed off undergoes still further manipulation and is reduced to something like its finished condition; the octagonal portions turned in the lathe have also been milled so that they are sharp and clearly defined as to their edges, and the filers then take them in hand and polish them up. The barrel itself is polished in a machine called "a steamboat," from the resemblance it has when in operation to the motion of an engine beam. This steamboat is simply two upright frames which have a vertical motion imparted to them by cranks; the gun barrels are arranged in these frames and are confined at the lower end between wooden clamps fitted to the size of the barrel. These clamps are supplied with oil and emery, and recede or advance by a spring-like movement, as the large or small part of the barrel is embraced by them. While moving up and down, the musket barrels receive a partial revolution, so that they are not polished in lines or seams. After running in these frames for a specified time, the barrels ars taken out and cleaned with sawdust, when they are ready to be rifled and tapped for the breech-pin. We may remark, however, that when the barrel leaves the "steamboat" it has simply a dead bright surface, which is deepened into a burnished gloss with a little fine emery paper applied by hand. In all of these operations the manual dexterity and skill of the workman is something wonderful to witness. In factories where men do not work by the piece, as they do here, the spectacle is vastly different. Comparatively slow, laborious, and lethargic movements are the order of the day. The interest of the workman in the several branches is decidedly small, and the chief items of anxiety seem to be the hours for ringing the bell to go home. Here no man stopped his work to gape at us, or surveyed us afar off as some curiosity, unclassified and unknown; *no man asked us the time*, showing that they had no time to ask it, but that all were intent on accomplishing as much as possible in the shortest period.

THE RIFLING PROCESS.

The rifling of a musket barrel correctly is one of the most delicate operations conceivable. It is yet a mooted point what amount of pitch or twist is the most desirable, and like many other mechanical questions it will probably remain an open one for all time; so much attention is paid to individual whim or caprice, and so little to definite experiment and sensible deduction from the results thereof. The pitch of the rifle groove in the Springfield musket is one turn to 6 feet; in other words, the ball turns once in going a distance of 6 feet. There are three grooves and three "lands" or ribs in each barrel, and these are not only an exact distance apart, but they also increase in depth from muzzle to breech. At the breech the depth of the grooves is 1½ 100th part of an inch, which diminishes regularly to the 100th part of an inch at the muzzle. The barrel is 40 inches long, so that, as may be seen, it is a task of great nicety and precision to do the work correctly. The Providence Tool Company have constructed a machine for this purpose which is far superior to any other in use, accomplishing as it does the rifling of two barrels at one operation (a feature not embraced in any other tool of its class) and being also entirely self-acting—another point not gained elsewhere. We are not permitted to mention the mechanism of this apparatus, but we may say that it works beautifully, as a machine, and turns out work of an irreproachable character. It dispenses entirely with surveillance, and is, in this respect alone, a great innovation on old styles. The barrels also revolve intermittently, so that each cutter travels in the groove of the other. Thus all of them are precisely the same distance apart, and exactly alike in all respects. Provision is made for lubricating the cutters by never-ending oil flow, which is circulated through pipes for the purpose.

Previous to the rifling operation, a thread has been cut in the end of the barrel for the insertion of the breech pin. The machine in which this is done is far superior to the one for the same purpose in the Springfield Armory, being much less complicated. This particular tapping machine has been introduced by the Providence Company, and it works with great satisfaction. Six barrels are undergoing the process of tapping at once, that number of taps being run through each breech. By this method the barrel is gradually threaded, and the saving of taps, costly tools, is very great. The barrels are placed in a sort of rack, or reel, and one of them is constantly being operated on in one stage or another; each movement of the reel throws up a finished barrel, which is removed by the workman and another substituted. The barrels are now virtually done; there are still a number of other minor operations to be performed, but we leave the cutting of site seats, brazing of sites, &c., as comparatively unimportant details; although we must say that very many important reforms have been introduced into this branch of the work by the Providence Armory, the machine for cutting the site seats saving three distinct operations alone.

It is a long way yet to the end of the musket, and we cannot dwell upon the lesser parts. Let us leave the barrels, and the rollers who toil and sweat at their arduous labor. They roll all day and late at night, and some one of them will be rolling, doubtless, years after this article is penned and forgotten. For every bullet fired on the field there are thousands cast, and every report of a musket calls hundreds more into existence in the Armory, until they stand a long row of silent agents of death, complete and fully formed in every respect. We read in heathen story that Cadmus sowed serpents' teeth, from which a crop of armed men sprang up who immediately fell upon each other and fought furiously. The enterprising manufacturers and ingenious workmen at the North sow no dragons' teeth, but by their cleverness and skill keep the vast armies we have in the field fully supplied with efficient weapons.

While the barrel of the musket has much of interest in the process of manufacture, the lesser parts of the lock, also the other details, such as the muzzle band, ramrod, cone wrench, &c., have each special points on which we might dilate not unprofitably, but we cannot do so without slighting more essential parts. Let us look at some of

THE SMALLER PARTS,

and under this head combined a general discussion of the lock and its accessories. Of these, the "wiper," as it is called, is a specimen of what can be done by a little forethought and ingenuity. The use of the wiper is to draw the charge, or clean the musket when foul; it screws on the end of the ramrod, and is in shape a corkscrew. Before it assumes this form, however, many different things must be done to it. It is in the first place flattened out of a steel rod so that it looks somewhat like a knife-blade; this is split up through the middle, which produces two fangs or prongs like a tooth, and these fangs are afterward twisted up like a corkscrew, as we have previously remarked. These wipers are then tempered, inspected, and are ready for use. At one time they were forged by hand by the hundred per day; now, by the aid of a drop press, over a thousand are easily turned out in the same time. The "seer springs" are also "dropped;" in other places they are made by hand, Colt's factory in Hartford being the only exception to this statement.

Every one who has seen a pile driver has the most fitting verbal illustration we could offer of a drop; the engraving will aid those, however, who have never seen one in forming a correct idea. The part to be forged is cut out in steel; or more properly speaking, there are dies for all the smaller parts and the different processes on them, many dies being required for some pieces, as the hammer, &c. These dies are made from the finest steel, most accurately modeled to suit the standard; the dies are then put together, the huge weight overhead comes down with tremendous force, and the red hot steel or iron is pressed into the required shape with great dispatch. It is incredible to any one who

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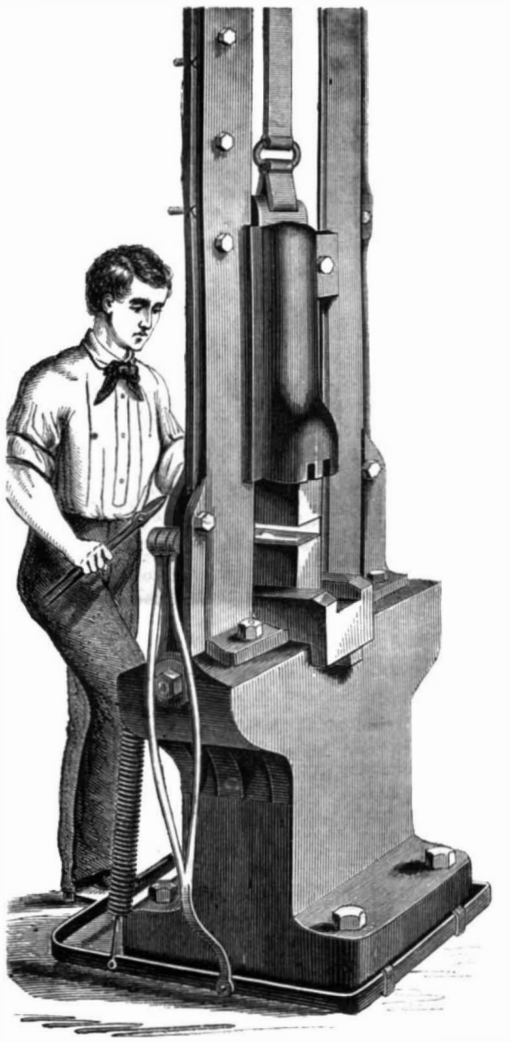
has not actually witnessed the making of these dies, to see what nicety is observed in their construction. A simple inaccuracy in the rounding of the side of the hammer (a thing that has no more to do with the efficiency of the gun than it has with the Commissariat Department of the Army) will result in its being rejected and thrown out past all remedy. The Government is merciless in this respect, and cares no more for the losses of contractors than if they occurred to the rebels. Of course, with such stringent regulations it is impossible to have other than good workmen. In the making of the small parts of the musket, the Providence Tool Company most specially excel. We were shown samples of the muzzle bands forwarded to them from another Armory with the supposition that they could not produce their equal. The difference between the two articles made at the respective shops is strongly in favor of the Providence Armory; so much so as to cause considerable remark when the two bands are

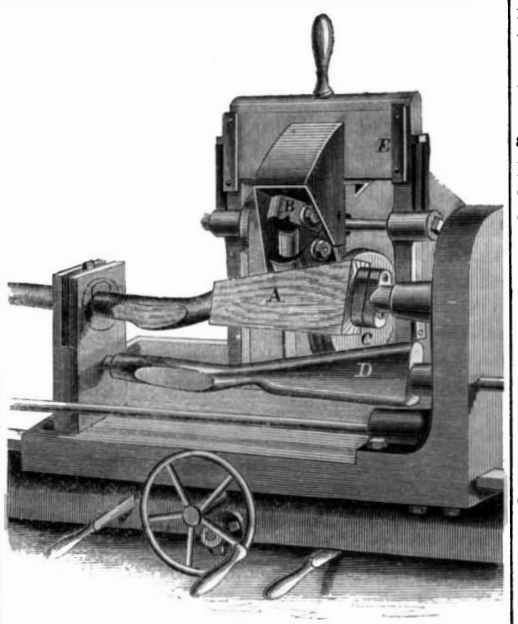


compared. The same is observed in the case of the "tumbler," which in the Providence Armory is the most perfect forging of its class that we have ever seen. The seer springs are dropped at the rate of several hundred per day, where a tithe of that amount were formerly made.

The main spring is justly charged with being the cause of a great deal of care and trouble. The most severe tests are applied to it; a force of 75 pounds being suddenly put on and as quickly removed. These springs are also dropped, and then bent to the proper shape in one operation. In this respect an important reform has been introduced at the Providence Armory: nearly one half of the labor of manufacturing this article having been saved. This is done in the bending process; the spring is bent by a peculiar apparatus, which instead of elongating it, as all others do, compresses it to the mold and leaves it in a finished condition; the springs are then filed, tempered, and afterward inspected and inserted in their places in the lock. The hammer is dropped; so also are the muzzle bands, and these are produced in immense quantities, one workman and helper being able to turn out a great many. The butt plates which encircle that part of the musket were once made at the Springfield Armory from malleable iron, owing to the assumed impossibility of making dies hat would stand; by an improved plan, which is to simply reverse the mold from its former position, the Providence Company make wrought-iron butt plates at the rate of many hundreds per day.

The details we have seen forged are taken to the finishing-rooms, where, by the aid of milling machines, lathes, and screw machines, they are worked up to the standards. It is impossible to convey any clear idea of the wondrous ingenuity visible in all these tools without the aid of profuse illustrations; but we cannot pass by one of them, devoted to cutting around the edge of the lock plate, without some slight comment. This machine cuts away all superfluous metal left by forging with such despatch and accuracy, that nothing remains to be done upon the lock plate but a slight polishing. The work fits the gage to a charm, and each one is an exact counterpart of the other. In a Springfield musket there are no less than 59 (not 47) separate pieces (beside the appendages), many of them extremely small. The futility of following all these through their several stages is apparent without further comment, and we dismiss them with this brief notice.

THE STOCK MACHINERY



is acknowledged by all persons to be the most ingenious, and at the same time the most simple that has ever been invented for the purpose. The rough stock, A, is shaped by the cutters, B; these run at a high speed and are guided by the wheel, C, rubbing against the pattern, D, or "former," of which we spoke previously. The frame, E, in which the cutters and guide wheel are placed, vibrates on a cutter at the bottom; the "former" and the work are right over each other, of course; but in our view the perspective brings one a little past the other. Both "former" and rough stock revolve slowly. The wood for the stock is black walnut, and has to be thoroughly dried in a steam-heated kiln before it can be used. The wood is sawed into a rough resemblance of the stock before it reaches the factory. It is then dried, as we have said, and when to be further worked up, is placed on a machine which faces that part devoted to the reception of the barrel; this is now a plane surface, and is made true and smooth, merely as a guide to future operations. In the Springfield Armory a circular saw is used for this purpose, but in the Armory we are now examining, it is found that a series of cutters, or knives, disposed around a metallic disk in a manner analogous to the teeth of a circular saw, do much better work. When the stock is faced it is then turned up in "tip and butt" lathes, which shape the rough outline of the stock. This is done in the manner described.

A musket stock is the most awkward and inconvenient object to turn that could well be imagined; nevertheless these tools run over all parts of it with a rapidity and precision unequalled. The above engraving will give an idea of the first turning machines, which produce the stock in a rough condition. Very great improvements have been made in the profiling machine by the Providence Armory, which materially lessen the operations required, but we are not permitted to divulge the nature of them. The "former" seen below, in the engraving, is a most difficult and costly thing to make. We were told that three months' labor—night and day—had been expended on the ones we saw, by the best machinists that could be had; a little inequality here or there having to be filed off where the "former" stood, as it could not be taken out. It was very hard to get men to work on this task, as they became discouraged in a short time, not being able to see much progress as the result of many days' work.

All the cavities for the insertion of the lock, as also the holes for the ramrod, for the screws, spring bands, &c., are made by machinery. The tools on these revolve with incredible velocity, and produce a sighing, mournful sound, as though they felt reluctant to complete their stint. The tip and butt machines especially gave forth doleful moans, crying out the while they scattered the chips far and wide, for the blood that was shed throughout the land and the part they were compelled to bear in it.

In all the processes above-mentioned, but not detailed, a repetition of the principle of the stock machine is visible, the details alone varying with the work required. The cavities for the lock are all directed by a pattern or "former" fastened to the machine, in which a guide or tracer follows; this tracer and the cutter are on one frame, so that the latter reproduces the motion of the tracer and cuts the wood wherever it is moved. The depth of all the holes is regulated by stops on the machines, and although the workman looks as though he were pursuing a most independent and wilful course, so dexterously does he move the cutters about, yet he could no more move one of them out of their path (without changing the machine) than he could alter the orbit of the sun. Here, as elsewhere the gages are in constant requisition, and each man makes sure that all is right before his work leaves him.

These tools have only been perfected after many years of study and thought. It is not claimed that all of them are peculiar to the Providence Tool Company, although the ingenious mechanics there employed have made many important additions to them. Every part of the work on the stock is done by machinery, even including the boring for the insertion of the ramrod in the stock; a tool being now under way for that purpose. Sand-papering and oiling, these not being done by tools, complete the wooden part of the musket, and it is ready to go to the

ASSEMBLING ROOM.

Here all parts of the weapon have been re-united again; in the process of manufacture some of them have met, passed each other, remained a brief while in company, then gone upon their several tours to complete their education, to receive polish and that finish which iron and steel, as well as humanity, receives by travel, when the parts of the lock, stock, and barrel are all united and put in their several places, no fitting or filing being required. Even the screws (no unimportant part), and the cone and breech screw, the elaboration of which we can find no room for, receive attention, and the musket, under the skillful manipulation of the workmen, is soon ready for inspection. Here we reluctantly dismiss special notice of the factory, having been able, in this lengthened article to touch but briefly upon the several points of interest.

We might easily devote an entire issue of the Scientific American to a recital of the wonders of, and ingenious mechanism in, the Providence Armory; but what we have already said will suffice to give an idea of the vast labor, time, expense, and thorough fidelity to detail and general plan which the Government demands of its contractors. We have purposely omitted all mention of the bayonet and ramrod, as comparatively foreign to our subject. These are manufactured in immense numbers for other companies: the Providence Armory having attained great celebrity for this particular branch of musket making.

We cheerfully seize this opportunity to disabuse the public mind of the idea that any kind of "diplomacy," "strategy" (much abused word), or other knavery under polite terms, will suffice to pass unworthy or ill-finished weapons into the hands of the Government. The locks (after the main spring has already had seventy-five pounds pressure applied to it) are tried in a special machine, so that all possible tests, short of letting a "drop" fall on them, are applied. So with all other parts—the bayonet, the screws, the seer spring, &c., are all severely proved

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as to their merits, and only passed when the inspectors (appointed by Government) fail to discover any flaw. Even a pin scratch in the barrel will condemn it; and such a venal offence as a faint black speck, not polished out in the under part of the hammer, or guard bow, cannot pass unrebuked. If after this there be any skeptical individual who thinks that rascality or double-dealing could be successfully practiced, we despair of their conversion. As we have previously remarked, the Providence Tool Company's Armory was the first private establishment to make all parts of the rifled musket, except the rear sight; that they could take this matter in hand and push it forward with the energy which has been done is highly creditable to the business management and mechanical talent of the concern. It is not asserted that these Works are by any means the largest in the country, or that they equal in extent the United States Armory at Springfield. It would be hardly reasonable to suppose that in two years a factory could be started from nothing, with comparatively green hands, or those unused to musket work, and achieve as much as the Government has been able to do in half a century. The weekly delivery of arms in the Providence Armory amounts to 1000; these figures will of course be increased as the experience of the Company is developed; certainly in executive and mechanical talent they are behind no works we have had the pleasure of inspecting; and it is fortunate indeed for the efficiency of our armies and the success of our cause, that the Government has been able to secure such a valuable auxiliary in the manufacture of weapons as the Providence Tool Company's Armory.

THE MANUFACTURE OF AMERICAN SILVER WARE.

Few persons—even of those actively engaged in mercantile pursuits—have any idea of the extent to which this business is carried on in our country, or of the annually-increasing demand for beautiful and costly ware of the sort in question. Of late years the call has been vociferous, and large numbers of mechanics and a great deal of capital are embarked solely in the production of articles for domestic use from solid silver. In this connection we make no allusion whatever to plated ware. One house in Providence, R. I. (Gorham and Company's silver ware manufactory), has had as much as two tuns of silver on hand at times in various stages of manufacture. A few hours spent in this manufactory some time ago gave us new ideas of the capacity, enterprise, and cultivated taste of our capitalists, artists, and workmen. To see a large factory stored full from cellar to garret of precious metal, being made into pitchers and basins as large as those used for personal ablutions, punch bowls that hold 16 gallons, and are as thick as an old-fashioned copper cent; to witness men busily engaged in turning, chasing, and even forging silver under a trip hammer; to gaze upon long thin ribbons of it issuing from between massive rollers and twisting about on the floor; to watch workmen spinning it up in lathes, gives one an utter contempt for the precious metal as a standard of value, and the visitor kicks the chips about with his feet just as he would so much cast-iron. Let not the reader infer from this familiar simile that no more value is attached to the refuse than to old iron. As all the hairs in our head have their places (or should, if men kept them in order), so every scrap and minute grain of silver finds its way to the melting-pot again and nothing is lost. Where the men "stone" the silver with rough blocks, the "tailings," as a miner would call them, or the "slush" in the trough below the bench, is all treated for the silver dust abraded from the work, and this is also true of other departments, so that but little loss is experienced in the course of the year. But let us begin in the lower rooms of the factory, and look at some of the interesting processes carried on. Every one admires the splendid table furniture and decorations made from this beautiful metal, and while there are not many of us who can afford to possess it, all may know how silver ware is made, and we trust that these lines will so familiarize the public with it that they will feel already as though they owned the fee-simple of the beautiful objects they will read of in this article, but which, alas! they cannot see. We introduce that exclamation, because no explanation, however deftly written, can bring out the superb lustre, the delicate tracery, or the fine modeling of some of the figures and more costly sets; so we leave this branch without further allusion, and plunge at once—metaphorically only—into huge piles of coin on the lower floor of the building, near the counting-room.

A great many ingenious men have puzzled their brains to account for the disappearance of silver from circulation, and have in their wrath pounced upon old stockings as the principal depository of the treasure. We can undeceive those gentry as to the destination of a portion of the silver; stockings are out of the question; tea-spoons, salt-cellars, gob lets, salvers, and other similar objects contain the "quarters" of the present period, and the premium of whatever per cent rules has to be paid on every dollar's worth that is bought. To us personally the twenty-five cent pieces looked like the phantasmagoria of a long-forgotten dream; they were round disks of silver and nothing more; they represented nothing; they were no equivalent, and we gazed fondly, in our superstition, at the paper due bill we held of Uncle Sam, representing 25 cents, firmly convinced that it was of more value than they. Yet in days long past, but soon, we hope, to return, these quarters had a metallic ring and were standard silver 900-1000ths fine. Of these quarters all the silver ware in this factory is made. After being received from the brokers, they are *broken* in a vice. By this means they are useless as coin, and the bad ones are readily detected; very few base coins are found. After the coins are tested in this manner they are melted down, cast into ingots, and rolled into sheets and bars, of a size suitable for the ware it is intended to make of them.

Some articles, as, for instance, punch bowls, salad dishes, &c., which are a deep oval in shape, and have curved edges at the top, are hammered into form; while others are bent to the proper dimensions in machines called "drops" (one of these drops can be seen on page 308). The mechanical processes connected with the manufacture of silver ware do not embrace any particular novelties, and the artistic excellence of the work determines its value; the intrinsic worth of the silver being a comparatively small item. First-class silver ware, like all other works of art, demands the employment of the highest artistic talent, as also models and patterns of the statues and pictures, bronzes, frescoes, &c., which were executed in the ancient days of the world, when Greeks and Egyptians, attaining to such perfection, bred eminent men in art; so that for all time since their studies have served mankind as copies, and educated modern taste up to a high standard. The Providence factory is a perfect museum in this respect, and we might have lingered long over the superbly chased cups, and elaborately carved patterns of vines, flowers, little groups in still life, &c., that covered the sides of vases, game dishes, coffee urns, and all conceivable forms and varieties of tea and dinner sets, and isolated pieces intended for gifts or presentation.

The figures, particularly, were beautifully modeled in solid metal; and the sharpness of each outline and distinct appearance of each feature in the miniature faces, was sufficient evidence of the executive ability of the artisans and artists in the employ of the Company. It must be borne in mind that these patterns are constantly changing, and that the public taste is as fickle in this respect as Flora McFlimsey's, who had nothing to wear while her wardrobe was closely packed with fine dresses. When a silver pitcher is to be ornamented, the design is first chosen and then sketched in pencil upon the outside; if the flowers or scrolls are to be raised, *repoussé*, as the French call it, the workman slips the object over an iron bar, having a small blunt steel point sticking up on its end like a poker; he then strikes the iron bar with a small hammer and the vibration of it causes the point just mentioned to spring the silver out; the pitcher is thus moved along, the workman continually striking, until a rough resemblance of the pattern is thrown up on the surface; this design is afterward rendered clear and distinct with small dies in the form of punches held in the hand and struck by a hammer in the usual way.

The other kinds of work, such as chasing, &c., are done with a three-cornered tool in a manner sufficiently well known without explanation. Napkin rings are made solid in this establishment, without solder of any kind, the ring being continuous throughout. The wavy lines seen on some of them are made by engine turning lathes. These machines are beautifully finished, and work accurately; by means of corrugated plates they make any kind of ornamental surface desired. In the manufacture of salt cellars there are many interesting processes, a few only of which we shall detail. Many of the salt cellars are spun up; that is to say, a flat silver disk is cut out and then placed in a lathe against a chuck turned up in the shape it is desired to make the salt cellar; the lathe is then started, and a tool applied to the side of the disk, which revolves rapidly; under the influence of the tool, the sheet closes over on the chuck, and thus is brought to shape. Sometimes two or three chucks are required to bring the design out. These roughly-formed cups are then polished, burnished, and further completed, by the addition of small medallions, headings, scrolls, &c. Some of the work is turned in the lathe, and the silver chips that fall on the floor are all gathered up and remelted. The value of these sweepings amounts to thousands of dollars in the course of a year.

When spoons are to be made, the silver is rolled into long strips, and then placed under a die, which cuts out a blank or the outline of a spoon. This blank is then drawn out and made thinner in some parts than others; the bowl is formed up in a die or mold made for the purpose, and the other end also struck up so as to raise the ornamental figures which are usually placed upon it. The spoons are then washed in dilute acid to clean them, polished, and finally burnished by rubbing them with soap and water, and a blood-stone or other hard substance. This process is also repeated on the fine pitchers, tea and coffee urns, salvers, and in fact all ware which has that brilliant lustre so universally admired. The burnishing in this factory was especially fine, and had a clear glossy surface without speck or flaw in it.

The chief charm to us in this extensive silver ware manufactory (the largest in the country, if not in the world), was the high degree of artistic taste and cultivation which characterized every piece, from the simplest butter knife up to elaborate services costing thousands of dollars. The great majority of mankind go through the world with their eyes closed and their senses deaf to all the appeals of nature, and the thousand beautiful things that teem on every side. A bee in a flower is an insect which makes honey at so much a pound, and sordid man falls to calculating the profits of bee-keeping, but omits to notice the color of the leaf, the blush of the rose, or the graceful poising on the wing of the industrious little worker. He calls this kind of sentiment useless, romantic, &c., and what nature spreads out before him he cannot see. An eminent English writer upon the fine arts (Ruskin) says:—

"Any material object which can give us pleasure in the simple contemplation of its outward qualities without any direct and definite exertion of the intellect, I call, in some way or in some degree, beautiful." And he is right; for the influence of beautiful pictures, statues, gold and silver vessels, is elevating to those who look upon them in their true light; not in that pride of the eye which exults in the possession of them, but as teachers; as elevating the taste, and leading mankind to live, not for the grossness of gain, but for the attainment of those virtues and qualities which alone make life cheerful and pleasant.

PROSPERITY OF THE OIL REGION.—All the petroleum flowing wells are located in the valley of Oil creek, Venango county, Pa. At the Governor's election, in the year 1860, this county polled 1,713 votes. At the State election, in the year 1862, the aggregate vote polled in the county was 5,060. This year the vote rolls up to 6,265. These figures indicate in some degree the steady and remarkable progress of settlement and increase of population in the oil region. A few years since this county was one of the wildest and most sparsely settled in Pennsylvania.

MESSRS. CHILDS & Co., of Allegheny, Pa., have been experimenting with flax batting as a substitute for cotton, and have succeeded in producing an article which is pronounced excellent.

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Death of Henry Fitz, the Telescope Maker

Henry Fitz, the well-known maker of telescopes, died at his residence, this city, on Saturday, the 31st October, in the 55th year of his age. Mr. Fitz was a maker of large telescopes, some of his construction being the largest that have ever been made in this country. On page 216, Vol. IV. (new series), of the SCIENTIFIC AMERICAN, an account was given of a visit to his work-shop, with an elaborate description of the mode of making telescopes.

Mr. Fitz was born at Newburyport, in the State of Massachusetts, in 1808. In 1818 his father, Henry Fitz, moved to Albany, in this State, and two years afterward to this city, where he was widely known as a Universalist preacher, and as the editor of the *Gospel Herald*. He was a man of comprehensive and intensely active intellect, with remarkable independence of thought; and all of these mental qualities were inherited by his son Henry, the subject of this notice.

While yet a lad, young Henry, desirous of saving his father the expense of printing his paper, went into the printing office to learn the art of setting type, and was soon able, with the occasional aid of a pressman, to perform the whole labor of the printing. On arriving at maturity he looked about for some trade requiring the highest mechanical skill, and determined to learn the art of lock-making; though previous to this he had tried his hand at making telescopes. He entered the lock manufactory of Mr. Pye, of this city—afterwards Pye & Day—and in the course of a few months he was the most perfect master of the trade and the most skillful workman in the establishment, so that the most delicate portions of the work were assigned to him. He afterwards went to Cincinnati and established a lock manufactory, which he soon sold. He then proceeded to New Orleans, where he established another lock manufactory, which he also disposed of.

Returning to this city soon after the discovery of the daguerreotype process, Mr. Fitz found his friends, A. S. Wolcott, and John Johnson, eagerly engaged in devising and constructing the reflecting camera, which was patented for taking the first daguerreotype portraits. They readily availed themselves of Mr. Fitz's nice mechanical skill to polish the reflector, and on the division of the patent he proceeded to Baltimore and opened the first daguerreotype establishment in that city.

He soon after sold the establishment, and returned to New York, when he gave himself up to the occupation which had been the dream of his boyhood—the making of telescopes—and this occupation he followed with ever-increasing intelligence, skill, and success, to the day of his death. He received very powerful aid from the amateur astronomer, Mr. Rutherford, who ordered first a 3-inch glass, and then others of a larger size, up to the 11½-inch instrument, which is equatorially mounted, with its revolving dome and elaborate appliances, in his private observatory.

The largest telescope ever finished by Mr. Fitz was the one with the 16-inch objective, heretofore described in the SCIENTIFIC AMERICAN. But at the time of his death he was engaged in grinding the lenses for a 24-inch tube, to which he designed to construct a mate of the same size—the combined light to be brought by means of a reflector, into the eye at the same time. He had recently bought a lot and built a high house, the upper part of which was finished in a manner suitable for the mounting and use of his large telescopes. In the midst of his plans he was attacked by consumption, and the disease was so rapid in its course that his death took most of his friends by surprise.

Mr. Fitz in person was tall and slender, and of the most restless and tireless activity. He had other gifts besides his rare mechanical skill. An intelligent friend who made one or two visits with us to his observatory was much impressed by his extraordinary talent for description. While dwelling upon the evidence furnished by comets of the existence of a resisting medium in space, his earnest and animated manner compelled attention, and conveyed the clear views of his transparent mind with singular distinctness to others; while his contagious sympathy imparted a portion of his own enthusiasm to those who heard him. Had he devoted himself to the pursuit, he would have made one of the most captivating lecturers on astronomy that was ever produced by this country or any other. His life was exemplary in every respect, and he was remarkable for his perfect simplicity of character. His mind was as pure as that of any man who ever lived. His most intimate friends never heard a profane or improper expression from his lips. The great instruments which he made will long convey intelligence from the remote parts of creation, but the record will be read by the eyes of others. His busy brain is at rest, and his hand has forgotten its cunning.

Maine Fisheries.

The fishermen at Lubec, Maine, are now industriously engaged. Cod, pollock, herring and mackerel are taken in considerable quantities, especially herring. All kinds of fish command a big price and the demand is good and likely to continue so for the season.

Cod and pollock fish are usually dried, though the former are "pickled," and thus cured are worth $5 and $6, the two hundred pounds in New York. Dry cod bring $6, per quintal. The large herring are smoked and pickled, and the smaller ones are pressed for the oil they afford. The herring are mostly caught in weirs. A hogshead of herring will afford five or ten gallons of oil, worth 70 to 85 cents per gallon. The herring when brought from the weirs are salted very heavily, being kept in the brine twenty-four hours or longer. The fishermen say this process of salting tends to "separate the oil from the fish." After the fish are salt enough they are put into boilers of the capacity of a barrel, larger or smaller as the case requires, and thoroughly boiled or cooked, thence transferred to the press, which is of sufficient power to express the "last drop" of oil from the fish. The oil, water, &c., passes from the bed or bottom of the press, which is water-tight, to tubs so arranged as to catch the whole. The oil rises and is dipped off into barrels. The "pumice" (as fishermen call it) or the remains of the fish after pressing, is sold to farmers, who use it on grass and tillage lands with good effect. A light sprinkling of grass fields will give a large crop of grass for two years. A large quantity of it proves injurious to both crops and soil as practical observers state. The herring oil business is of recent inauguration, but adds very largely to the profits. Formerly the small herring were used on the grass lands or lost entirely, now the whole are used.

It might be said in truth that "everybody is in the fish business." By the side and at the head of every cove and inlet men and boys are employed, and they work with energy and good will. They are up nights attending weirs; in fact when fish are plenty no men work harder or more diligently than the fishermen. On one day lately we saw fourteen hands, mostly boys, all stringing herring. The price paid is 20 cents per hundred for stringing, and boys will work with surprising dexterity after a short experience. A very smart "stringer" will string 2,000 per day, though we presume that the average is about 1,400 per day. The sticks are counted off in lots by the foreman and each stick must contain a certain number of fish. In this way the day's work is easily ascertained. The whole business is very well systematized and is conducted with great regularity. Herring bring in New York market 40 to 50 cents per box. One party informed us that he should probably put up 12,000 to 15,000 boxes of smoked fish the present season. Other firms and individuals put up more or less, besides pickling, drying and making oil.

The fisheries are a source of large revenue. The profit is very much larger than that of any other business. The work is such that boys, girls even, and men all engage in it and their time is well paid. The profits accruing from the fisheries in Lubec this year will exceed the profits of the lumbering or shipbuilding in any other town in the county. The aggregate of the business in one year would astonish anybody who will make a calculation of its value, and none more so than many of those engaged in it, although each one is supposed to know his individual gains.—*Machias Union.*

At a convention of lager bier brewers recently held in Cincinnati, a reward of $500 was offered for a substitute for rosin.

Immense Activity in Machine Works.

Nothing like the present activity in machine shops has been known for years; new firms are starting up in every direction, and all who are so fortunate as to have a shop moderately well stocked with tools have more work than they can possibly do. At the West a similar state of things prevails, if we may credit the following paragraph cut from the Buffalo *Commercial*:—

"Until some eighteen months since the Vulcan Iron Works was employed almost wholly in the manufacture of flouring mill machinery, having furnished the works for a large number of mills in the Western States and territories. Latterly, the building of marine engines has constituted the principal portion of the business; and some of those turned out have performed so admirably as to reflect the highest credit upon those having the superintendence of them. The following forms a portion of the engine work done at the Vulcan during the period above referred to:—

"Rebuilt, two engines for propeller *Marquette*, cylinders 24 inch bore, 36 inch stroke; engine for tug *Hippodame*, 30 inch bore, 30 inch stroke. Engine for tug *Anna Dobbins*, built for T. D. Dole and J. Rice, 24 inch bore, 26 inch stroke.

"Engine for tug *Notter*, 20 inch bore, 22 inch stroke.

"Rebuilt engine for propeller *Toledo*, for New York Central line. The engine was formerly an oscillating cylinder on propeller *Euphrates*.

"Engine for tug *J. W. Harcourt*, 20 inch bore, 22 inch stroke.

"Engine for tug *T. J. Schuyler*, 16 inch bore, 16 inch stroke.

"Low-pressure engine for propeller *Atlantic*, 41 inch bore, 36 inch stroke.

"Rebuilt engine for propeller *Genesee Chief*, 28 inch bore, 28 inch stroke.

"Two engines for tug *E. P. Dorr*, 17 inch bore, 16 inch stroke.

"Engines for steam packet *Fawn*, 12 inch bore, 12 inch stroke; built for M. Courtwright, of New York, to be employed on the Dismal Swamp Canal, in Virginia. The *Fawn* is 93 feet long and 12 feet beam. On her way to New York, whither she started as soon as finished, she made ten miles per hour, easily, in the canal. She is now used as a despatch boat by the Government.

"Engine for tug *Mary E. Willis*, 12 inch bore, 12 inch stroke.

"The Vulcan is now turning out a full set of machinery for an extensive flouring mill in Minnesota, including the stones and other furnishings necessary to complete the mill. It is also engaged upon two low pressure engines, 41 inch bore of cylinders and 36 inch stroke. These were contracted for by T. D. Dole, Agent, and are to be placed in boats building in Cleveland, to be finished on the opening of navigation next spring.

"Several high-pressure engines for various parties are also in the course of construction.

"Tremper's celebrated governor and cut-off, acknowledged to be the best regulator of motion in use, is also manufactured exclusively at the Vulcan Works. We understand that the demand is so great for this invention that it is sometimes found impossible to fill the orders as they are received.

"The Vulcan Works are situated on Water street. The proprietor is George C. White, Esq. Mr. E. Weston is the business manager of the concern, and it is to his energy and perseverance that it is mainly indebted for its present prosperous condition. The mechanical Superintendent is Mr. Wm. Moses."

It is estimated that the mineral wealth of Nevada Territory will be sufficient to pay a national debt of $20,000,000,000, to give every returning soldier a musket of silver, and to furnish all our iron-clads with a plating of silver thicker than their present covering of iron. At that rate bankruptcy does not seem imminent.

To ascertain the bursting or centrifugal force on the rim of a fly-wheel, multiply the square of the number of the revolutions per minute by the diameter of the circle in feet and divide the product by 5 780. The quotient is the centrifugal force in terms of the weight of the body.

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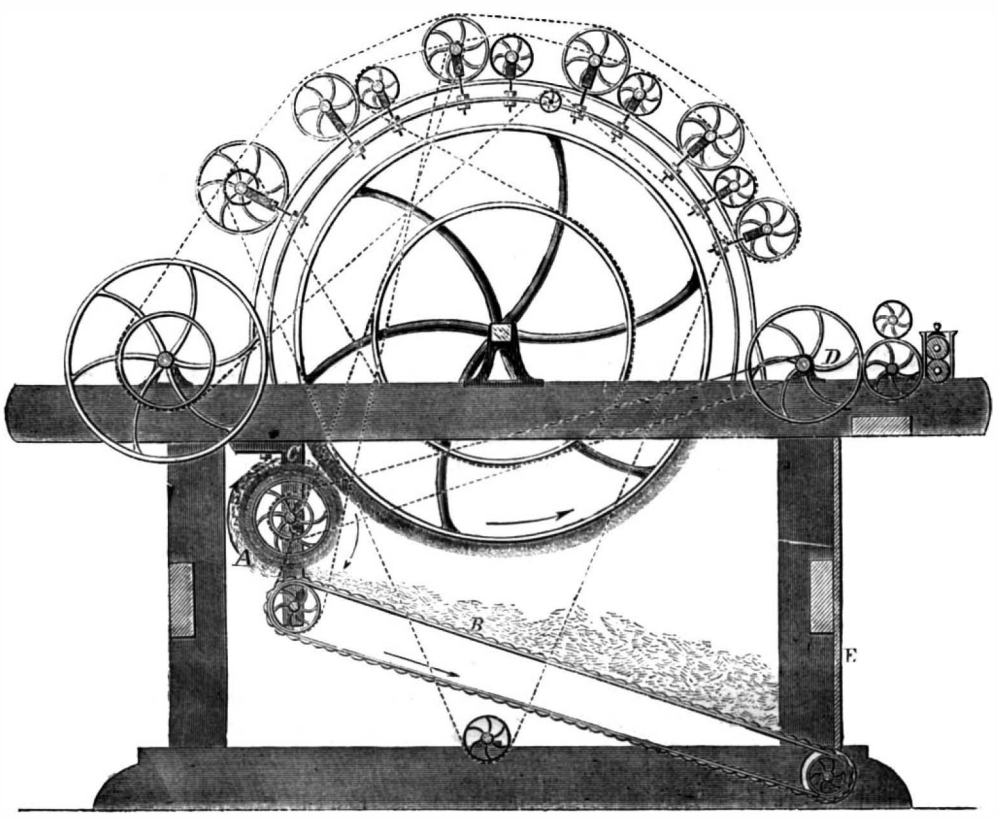
Improved Carding Machine.

The exorbitant prices demanded for cotton and woolen goods at the present time and the cost of the raw material, renders any improvement in the machinery by which it is prepared highly acceptable to both manufacturer and consumer, as inventions generally tend to lessen the cost of production. The accompanying engraving sets forth an improvement recently made in carding machines, by which the waste which usually falls on the floor beneath the card is caught by suitable apparatus and returned to the card again.

The change consists in applying a card-covered roller, A, in connection with the endless apron, B, to the ordinary carding machine. This roll, A, is carried by the hanger, C, which is itself fastened to the main frame of the card; it will be seen that as the fiber is fed to the main card and carried over by it, all that naturally tends to waste is caught by the endless apron and carried on to the small card previously mentioned. This latter runs at a low speed being driven by the small pulley, D. The apron is made of wood nailed to leather straps and the slats join each other tightly at the edges, so that nothing escapes between them to the under side, thus tending to clog the roller. The board, E, is placed at the bottom of the apron to prevent the waste from blowing away out of reach of the same. The small card roll may be driven from the licker end shaft, or the stripper shaft. The apron is so far from the main card that no difficulty is experienced with currents of air, the fiber laying perfectly still until delivered to the main card again. The small card can be set so as to pick up the fiber and leave the dirt; this is carried over by the apron and thrown on the floor, from whence it is afterward swept away. This invention was patented on Oct. 6, 1863, through the Scientific American Patent Agency, by Lawrence O'Brien, Indianapolis, Ind., and can be seen in operation at Geisendorff's Woolen Factory in that place; for further information concerning it address the inventor as above.



O'BRIEN'S IMPROVED CARDING MACHINE.

Our National Credit.

In spite of all the chicanery and double-dealing of desperate politicians, the confidence of the people in the ability and stability of the Government is unimpaired. The sales of national bonds and stocks, independent of other events, is the best proof we could offer in support of our statement.

"The Subscription Agent reports the sale of $16,500,000 five-twenties on Saturday, Oct. 31st, making $36,000,000 for the week. Some delay may be experienced in the delivery of large subscriptions; but it is the intention, as far as possible, to deliver on subscriptions all amounts under $3,000.

"The public will bear in mind that less than $150,000,000 of these bonds remain unsold, and that foreign competition is very heavy. The loan will probably all be taken before the 1st of December, and there is no obligation on the part of the Treasury to retain it for public bidding. The last hundred millions will therefore be taken by capitalists, trust companies and banks; and it is the wish of the Subscription Agent to avoid any favoritism to combinations, by giving people timely notice of the contingencies of the loan being consumed, and summarily placed beyond their reach, except at a premium."

The Sublime Porte, that is the Turkish Government, has offered to buy the steam rams that were built for the rebels but which didn't get away, for $650,000 each.

MANUFACTURE OF BOOTS AND SHOES BY MACHINERY.

The old system of making boots and shoes entirely by hand labor will soon, to all appearance, be numbered with the relics of a past age. Our war having created an immense demand for boots and shoes, hand labor was found unequal to the task of supplying it; but necessity—well-named "the mother of invention"—soon provided a remedy. Machines have been constructed and are now in use executing the different operations necessary to the manufacture of such articles, and with a rapidity and accuracy of action which far excel the efforts of hand labor. A manufactory in which boots and shoes are made upon an extensive scale, by machinery, has been established at No. 23 Park Row, this city (Messrs. Burt & Terhune), where we witnessed the operations a few days since, and will describe them as briefly as possible.

Three large apartments are occupied by the operatives, mechanism and goods. The skins for the uppers are first spread out, examined and selected according to the purposes for which they are required. Different cutters then cut out the respective parts according to the size and form required, and these are all arranged and classified. After this these separate parts are given out in lots to be sewed by machines, and those uppers which are intended for boots are crimped, and the whole made ready for receiving the soles. The more heavy operations of punching, sewing, pegging the soles and finishing the articles are next executed. The sole leather, in hides, is first steeped in a tank of water to soften it, then it is thoroughly dripped, and afterwards cut by a machine into measured lengths of a certain breadth, according to the size of sole wanted. After having become sufficiently dry, these cut strips of leather are run between rollers, and also submitted to severe pressure under plates in a press, so as to effect as complete a compression of the fibers as is attained according to the old mode by beating with a hammer upon a lapstone. From these compressed strips, soles of the different sizes are punched out at a single blow by a machine, the cutter of which is of the size and form required, and it turns round so as to cut a right and left sole alternately. Heel pieces are also cut out by hollow punches at a single blow. The edges of the soles and heels are next smoothed and polished in a small rotating machine, and another machine then makes the channels in the soles for the rows of stitching. After this the under soles and uppers are fitted upon lasts and made ready for sewing. This operation is executed by Mackay's peculiar machine, adapted for this specific purpose. The waxed thread is wound upon a vertical spool, and is conducted through a guide situated on the top of an elbow secured on a swivel joint capable of turning under the needle, and conducting the thread into the crease around the sole. The needle operates vertically above the sole, and the waxed thread is fed into the interior of the boot or shoe by the guide, the needle descending through the sole, drawing through the thread and forming the stitches, which are pressed down close into the crease by a tracer-foot, upon which great pressure is exerted. In this manner the sole and upper are united firmly and neatly together in a few seconds without employing a welt. Hand sewing cannot be compared with such machine-work for accuracy and rapidity. Another machine is employed for putting on double soles with copper pegs. A thin strip of copper is fed in at one side, and the holes are punched in the sole, the pegs cut and put into the holes, and then driven down at one continuous operation, with a speed corresponding to that of sewing the soles. The crossing of the half sole at the instep is pegged, and also fastened with a screw at each side by hand; the heels are also pegged down. The edges of the heels are neatly trimmed by a small rotating machine, and the soles are also rubbed down by a machine, so that nearly all the operations connected with the manufacture of boots and shoes in this establishment are performed by machines designed especially for the purpose. The legs of the boots are stretched and the wrinkles removed by new boot-trees secured to benches and are expanded in an instant from the interior by pressing on a treadle with the foot. These boot-trees are altogether superior to the clumsy old wedge kind. The materials used in the manufacture of these articles appear to be of a superior quality, the machines not being adapted for operating on inferior patch leather. Another novel feature connected with these machines is that they are driven by one of Roper's hot-air engines, illustrated on page 97, Vol. VIII. (new series) of the Scientific American. It has been running for several months, requiring but little attention and consuming a very small quantity of fuel. The accurate operations of these machines and the rapidity of their action place them in a highly advantageous position for manufacturing boots and shoes. The price of hand labor had become so high and workmen so scarce that such machines became a necessity, and the change effected by their use is equal to four times the quantity of work executed by hand labor. That is, one hundred men will turn out with these machines as much work as four hundred men without them. The saving of labor to the country is therefore immense. About 500 pairs can be turned out daily in this establishment. Perhaps no labor connected with boot-making is so severe as that bestowed upon burnishing the heel with a warm iron. This work is still executed by hand, but a machine is now being set up to accomplish this finishing operation, and it will soon be at work. For centuries no improvement seems to have been made upon the old system of boot and shoe making; when, all at once, as it were—within the space of two short years—the whole art has been revolutionized.

Honey Vinegar.—Mix 1 pound of honey with a gallon of cider, and expose it to the sun, or keep it where it is warm, and in a few months it will be so strong that water will be necessary to dilute it.

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VOL. IX, NO. 20 ...[NEW SERIES.].....*Nineteenth Year*

NEW YORK, SATURDAY, NOVEMBER 14, 1863.

REFORM NEEDED IN MANUFACTURING ESTABLISHMENTS.

There can be no subject more vitally interesting to a large part of the community than economy in manufactures, and some observations we have made about the country within the past few weeks, have convinced us that there is still a great deal to be done by portions of the manufacturing capitalists and those concerned in carrying on their works, towards simplifying, expediting, and as a matter of course, cheapening the article produced. We do not so much allude to the value of labor-saving machinery in this paragraph, as to other things which only require the exercise of a little forethought, and—may we say it?—common sense, to remedy the evils noticed and hereafter alluded to.

It is but a few days since we saw an article in the course of construction (in a large factory, too,) that was taken into one room to receive some manipulation, carried from thence up three flights of stairs to be still further treated, from thence again transported a few rooms further off, and finally brought back again to the place it started from; having, in all this roundabout journey had something like one dollar added to its value. Now with proper management the whole process might have been carried on in regular routine, and the raw material brought in at one door and turned out finished at the other.

In the case referred to the special services of one man and a boy were required merely to carry the wares around, and where, as was the case, much work was to be thus shifted about, large sums were annually expended for which there was really no return. When competition is as active as at the present time, it is certainly important to make every minute useful. In the case of labor-saving, quick-working tools and methods, a lack of appreciation is painfully apparent in some places. Lathes that ought to cut 50 feet per minute (varying, of course, with the size and character of the work), run at 25 feet; and blundering old tools, that have cutting edges at every conceivable angle of inefficiency, are far too abundant. We make these remarks in all seriousness, feeling keenly that the results springing from such neglect and abuse cannot be otherwise than mischievous.

It is very singular that so few manufacturers appreciate the effect of cleanliness, good order, plenty of light, air, and fresh water to drink and to wash in in their factories. A dirty shop is an abomination in every sense, and is a moral offence for which there is no excuse. Light is as necessary to good work, both in quantity and quality, as it is to the health of the men; so also is fresh air and water. If these were only physical comforts to the operatives we should be justified in urging their adoption; for every man that works ten hours is entitled to all the advantages we have enumerated; but the question does not rest wholly upon the feelings of the workmen: it concerns, most intimately, the amount of profit and loss, as any individual will acknowledge who thinks five minutes upon the subject. On the one hand we have a close, stuffy, noisome, ill-lighted shop, where the men stumble over tools, bump against walls, or drop their work on the floor and grope half an hour to find it; and the men are pale and unwholesome from confinement in unventilated apartments. On the other hand we have plenty of windows, white-washed walls to reflect the light, clean shafting, true running pulleys, belts set up to their work, wide alley ways to walk in, tools clean and in good order, ventilation in all seasons and warmth when required, water at hand, and water-closets convenient. Can any sane man compare these two factories, stocked, we will suppose for the sake of illustration, with similar tools and men of equal intelligence, and then doubt which one of them will accomplish the most in the same space of time? "Time is money,"—an old axiom and one of the truest ever uttered. It needs no soothsayer to foretell the advantages springing from enterprise and a determination to keep pace with the times, and employ every useful idea that suggests itself or is practised advantageously by other parties. The age is a fast one, and among mechanics speed is not always a precursor of disaster, but rather of rapid progress.

MANUFACTURE OF TAR.

Tar is a remarkable product, and is usually derived from wood and bituminous coal, by submitting these substances (excluded from the atmosphere) to a certain degree of heat. The operation is called "destructive distillation," because the heat destroys the nature of the original substances, producing results of a totally different character. Wood and coal tar, although similar in many respects, are quite different in others. They resemble one another in being dark, semi-fluid and sticky, but their odor and composition is dissimilar. Coal tar is the most interesting of the two, as no less than forty-two distinct organic products have been extracted from it; it is the chief source of the ammonia of commerce, and those aniline crimson dyes that are now so common and attractive. Respecting this tar, however, we will say nothing further at present; our object being to direct attention to its congener—wood tar. It contains creosote, eupion (an oil), pittacal, picamar and a few other distinct substances; but it is not employed for the manufacture of any such products as those derived from coal tar. It is, however, a very useful substance and is employed extensively in the arts as a preservative of rope and cordage from decay. Large quantities of it have always been required for naval stores, and for preparing cordage for ships in rope manufactories. North Carolina and portions of Georgia formerly furnished nearly all the tar that was required in America and Europe. It was manufactured from the old pine trees which had ceased to yield turpentine, and dead wood rich in resin. A pit was excavated, generally at the side of a sand bank, and a large cast-iron tank placed in the bottom with a pipe leading from it down to a tank. The pine faggots were piled in the pit, forming a conical-shaped heap, which was covered and fired in the same manner that charcoal is made, by the old-fashioned methods, in all our forests. The wood thus submitted to heat, and protected from being burned, was subjected to crude distillation, and the tar trickled down to the pan at the bottom of the pit, and was conveyed by the pipe into a tank there, and placed in barrels ready for exportation. Now, tar can be manufactured from resinous pine wood in any part of the world by the same simple method, but the quantity thus obtained is small compared with the distillation of pine wood in suitable retorts. As the dead pine wood was abundant and of little value in North Carolina, refined processes of distilling wood to obtain the tar were not employed. In other parts of our country, however, it may be profitable to engage in the distillation of wood, not only for the tar that may be obtained, but the residual charcoal, which may be sold for a good price. When dry pine wood is placed in a retort, and submitted to such a heat as will volatilize it, tar passes over by an exit-pipe and falls down to the bottom of a tank of water through which the exit-pipe is conducted. The coal tar is obtained in the same manner in gas works; tar being one of the products of destructive coal distillation. In districts of Europe where timber is far more valuable than in America the pine wood is not burned in heaps, but carefully distilled in retorts to obtain the tar, and in some sections of France, where tar had not been made for thirty years, its manufacture has become extensive within two years, owing to the failure of American supplies. A great variety of retorts have been used. One kind consists of two retorts, an inner one containing the wood, and an outer one surrounding it, with a space between for the fire. Another retort is vertical, formed like a cylinder with a manhole on the top, the furnace situated at the bottom, and a spiral flue extending to the top of the retort. But tar may also be made in the cast-iron retorts employed for distilling coal in our gas works. Care must be exercised in firing it, as the heat should be comparatively low, otherwise a great portion of the volatile products will pass off as gas and be lost. The whole process consists in placing dry pine wood in the retort, then enclosing it air-tight and subjecting the pine therein to heat from a low fire under it in the furnace. The volatile matter which is driven off is carried by an exit-pipe into a refrigerating tank, where the tar is retained, and the residue left in the retort is charcoal. All kinds of wood, when subjected to destructive distillation, yield tar, but pine in the greatest quantities.

THE BEARINGS OF SHAFTS.

So little attention is given to this subject by persons who ought to know better, and so much indifference is manifested to the results of neglect, that we have felt it important to call attention to the subject, and by pointing out the causes of disaster, bring the matter to the direct attention of all interested. Many steam engines have been disabled, and the safety of the passengers and cargo imperilled when on ship-board by inattention to the condition of the bearings. We have ourselves seen a large beam engine slowed down and finally stopped entirely from the cause alluded to; so hot had the beam center (the part injured) become, that the utmost efforts of powerful men and a large sledge weighing some twenty pounds were unavailing to slack off the nuts which held the "binder" down; as for unscrewing the nuts in the legitimate way—with a wrench—that was out of the question; a three-fold block and luff tackle would hardly have started them. In the case alluded to, the diameter of the center was perhaps 14 inches by about 20 inches in length, and although for thirty minutes previous to the disaster everything was working properly, so rapidly did the bearing heat up that, if unattended to longer, it would probably have split the pillow block, there being no other possible outlet for the expansion. We have cited this case as one showing the importance of close surveillance of the detail in question, for not only is valuable time lost, but the machines themselves are greatly injured, sometimes involving costly repairs. In turning up shafts and bearings we have observed a reprehensible practice in some shops, and that is the use of the file. No good turner would employ such a tool to finish work that ought to be done by the cutter. The tendency of filing is to produce irregularity, and when the work is heavy and the speed slow, the use of the file is the hight of absurdity and ought not to be permitted by any foreman.

The beautiful glaze produced by a sharp turning tool is as nearly akin to the working surface made on shafts by long running as any new journal can be, and consequently a well turned bearing is much less likely to heat and cause trouble than a filed one. When new shafts heat at the outset, a little time and patience will in general suffice to bring them down to their work, and in all cases it has been found the best practice in this country, to bore the brasses from a sixteenth to an eighth of an inch larger, according to the diameter of the shaft, so that the journals may bottom fairly and not touch the sides at all. When shafts are "side bound" they will invariably heat, because in addition to the peculiar rolling friction of the work there is added the weight of the metal, which in shafts of 15 and 20 tuns is an important item. Of course weight is present in any case, but in a well fitted bearing it is dead, and not *wedging weight*, so to speak, such as exists in brasses which fit tightly to the sides of shafts. In our best machine shops files are virtually discarded in fitting large brasses to bearings; as in addition to their awkwardness, there is the expense of them to be considered; besides this the peculiar harsh surface they leave is not favorable to a cool bearing. The scraper is substituted with good results, both of time and execution, as when well done the scraped brass is perfectly mirror-like, and is re-

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duced to a working surface in a short time. Shafts may be well turned and properly fitted to their places and yet heat beyond all control; this evil can sometimes be remedied by applying *medicine* to the shaft with the oil, in the shape of black lead, sulphur, and in cases of great emergency, common quicksilver; this last substance is most excellent for curing journals that have been cut of the peculiar rough surface they acquire, as it produces a kind of greasy gloss that for a short time covers up the neglect or misfortune of the engineer. Where all other measures fail the brass itself must be taken out and its composition changed: either it is too hard or too soft for the journal. We have known of a chronic hot bearing being cured in this way, after a great deal of time and labor had been expended in keeping it in running order; even to the extent of playing upon it with an inch hose throughout the trip. In the navy all the journal boxes on the new gunboats are hollow and fitted with pipes through which a stream of water passes continually. Some merchant ships are also thus fitted.

It is a curious fact in connection with bearings that they will occasionally defy all the efforts of experience and science to reduce them to obedience after they once heat thoroughly. It is possible that this effect may be traced to a want of proportion between the size and the labor on the shaft; but of two bearings both precisely similar (in fact on the same shaft), we have found that the one which had the most duty to perform behaved the best. This is of course an unusual case, and is merely cited as an example of the previous remarks. When shafts set in brass boxes heat, they merely cut the shaft or the box, but when Babbitt metal is used, heating causes mischief that can only be repaired by overhauling. One peculiar effect of white metal is to reduce iron journals much more rapidly than brass; where brass boxes are lined with Babbitt metal, as is often the case, the iron journal will be found very much worn down where the white metal comes in contact with it, while the brass shell of the box is but slightly thinner than it was originally. This is owing to the peculiar toughness of the white metal; where journals are run in this substance and well lubricated, they acquire a perfect surface in a short time that very much lessens the friction of an engine or other machine. We have seen large engines "turned over the center" when the steam gage did not show a pound of steam; this is not wholly owing, as many suppose, to extreme delicacy of workmanship and tightness of the working parts, but to the vacuum produced in the cylinder by the almost infinitessimal portion of vapor admitted to it; and although the steam gage may not indicate any tension whatever, there is a certain amount in the boiler which is transmitted to the cylinder, or else the machinery could not be moved. This is a little digression from the subject of bearings, but is in a measure connected with it; for while we stated a few lines back that free movement was not entirely dependent on easy bearings, we must admit that a stiffly connected engine will not turn the centers readily; where the resistance amounts to more than the vacuum is able to overcome, of course the engine must stand still.

A great many engineers seem to think that slacking off a hot bearing will cool it, independently of other considerations; this is not always the case. Too much friction is of course a source of derangement, but excessive freedom is also a fruitful cause of hot bearings; this may be accounted for by the theory that the oil is pounded out by the journal in jumping up and down, and it thus comes in contact with the naked metal; the fact remains true whatever be the reason assigned. Good lubricants, care and cleanliness, will generally result in handsome bearings; no one will question that a large amount of power is absorbed by a rough bearing, or one half oiled. Stop up the oil holes, and if the collars have much play back forth, arrange leather shields to cover the space; keep dirt out and oil in, and much better results will be obtained than where carelessness is practiced and filth allowed to accumulate.

It is stated that a large district has been discovered in Russia, which yields petroleum oil in great quantities. Col. Gowan has obtained a grant of 30,000 acres on which to commence operations.

FRIENDLY WORDS FROM INVENTORS.

The eminence our countrymen have attained in the arts and sciences is not undeserved, and we need not search far to find the cause for it. The incessant activity of inventors has resulted in placing this country foremost among nations in all that appertains to the prosecution of war, or the more gentle triumphs of peace. Europe, so long the boast of foreigners as the cradle of taste, enterprise, art and science, now stands agape with wonder at the performances of our artillery, the achievements of our gunboats, and the perfection of our shot and shell. Not more at these, however, than the sewing machines, knitting machines, looms, plows, bee hives, and an infinite variety of other articles which the fertile brains of our inventors are continually originating and causing to be manufactured for their own benefit and --indirectly—that of the public; for every man who devises something to lessen the severity of labor, or reduce the prices extortionate speculators have put upon the necessaries of life, is really a public benefactor, whether he wishes to appear in that light or not

Even to us, who have for so many years enjoyed the confidence and successfully prosecuted the claims of inventors, it is sometimes a matter of astonishment to see the results of thought and mental toil which are daily forwarded us from all parts of the country. *Tangible thought* are these models, for here we have before us the solidified mental efforts of days, weeks, months, and even years. And we have often looked upon them considerately in view of the immense labor, energy, and untiring perseverance some of our patrons have bestowed upon their conceptions.

We have a long counter in our office divided into compartments and fitted with several wide shelves; these shelves are weekly loaded to their utmost capacity with models of every conceivable kind, which are subsequently despatched to the Patent Office for examination. Year in and year out, this has been the case, and still the inventions come forward with a rapidity which is remarkable. It actually seems as though one invention bred another, and that the departed lot had left seed behind them that blossomed out into all sorts of labor-saving and money-making machinery. We have the gratification, too, of knowing that our patrons are pleased with the efforts we are constantly making in their behalf, and that each and all of them are almost like personal friends. All the way from New Orleans, we have received this friendly greeting:—

MESSRS. MUNN & Co.:—Your favor of the 12th ult., notifying me of the granting of my patent for a pocket sewing machine, is received. Allow me to return my grateful acknowledgments for the prompt manner in which you have forwarded my case. I shall take much pleasure in recommending your Agency, and will place in your hands another case of my own in a few weeks.

Respectfully, &c., W. D. HEYER.
New Orleans, Oct. 10, 1863.

And another from Massachusetts:—

MESSRS. MUNN & Co.:—I have the pleasure to acknowledge the receipt of my Letters patent for an improvement in power looms. Please accept my thanks for the interest taken in securing this patent for me. I am now experimenting on two other inventions respecting which I shall soon ask your opinion, as I perceive it is one thing to invent and quite another thing to procure a patent. I shall consult you on all my improvements in future, and shall not fail to recommend inventors to you for assistance, which I am assured will be both accurate and valuable. Your humble servant,

D. S. ESTEN.
Hinsdale, Mass., Sept. 21, 1863.

Also this one from New York State:—

MESSRS. MUNN & Co.: *Sirs*—I received my Patent for improvements in knitting machines on the 21st inst. I am highly pleased with the papers, especially with the wording of the claims and the execution of the drawings. They confirm my previous high opinion of your ability. Your manner of conducting my business has fully met my approval, and I shall be happy to transfer my patronage to you in the future. Very truly yours,

ISAAC W. LAMB.
Rochester, N. Y., Sept. 24, 1863.

Such communications as these are extremely gratifying to us, and tend very greatly to foster that friendly feeling which is always desirable in business intercourse.

The amount of revenue stamps required on a deed of a marble quarry in Vermont, was $480.

Late severe frosts in the West have not injured the sorghum plants.

STATE OF BUSINESS AT THE MORGAN IRON WORKS.

During a recent visit to the Morgan Iron Works, in this city, we noticed a large number of steam engines under way, proceeding rapidly toward completion. The Morgan Iron Works is one of the oldest machine shops in the country, and takes its present name from Charles Morgan, Esq, a gentleman well known in the mercantile community. Ever since 1830, and rather before that, if we are not in error, these works have been actively engaged in manufacturing steam engines and other machinery of all kinds, for which they have won a high reputation. In all the four corners of the globe their machinery can be found in active operation. When the firm first started it was under the direction of Messrs. Secor, who were succeeded by Charles Morgan, Esq., and this gentleman eventually by Mr. George W. Quintard, who has now the sole direction of the works. Other parties have, from time to time, been associated with Mr. Quintard, but at present he is the principal proprietor and manager. Some of the first engineers in the country have "graduated" from the machine-shops of the Morgan Iron Works, and at this moment in China, India, South America and California, to say nothing of others at home, there are numbers of engineers who acquired preliminary instruction at the works mentioned.

The aggregate number of steam engines and boilers built at the shops during the thirty-five years they have been in existence amount to a great many, but we have not yet ascertained the exact quantity; at the present time there are now on hand, for government and private parties, the following engines and boilers:—

Two horizontal engines, 100-inch cylinders by 48 inches stroke of piston, for the new sloops of war about to be built by Government. Four, 30-inch cylinder by 96 inches stroke, for the *Idaho*, also a Government vessel; designs for machinery by E N. Dickerson, Esq.

One, 60-inch cylinder by 12 feet stroke, for Marshall O. Roberts, Esq; designs also by Mr. Dickerson.

One, 60-inch by 10 feet stroke, for Mr. Livingston.

Two, 84-inch cylinders by 45 inches stroke, for the Italian frigate *Re don Luigi Di Portugallo.*

Two, 58-inch cylinders by 8 feet 6 inches stroke, for the Government double-ended fleet; also, 6 large boilers for the above machinery.

Mr. Myers Coryell is the efficient superintendent of the Morgan Iron Works, and under his direction many of the finest and fastest vessels in the country have been fitted with steam power. Mr. Coryell has been connected with the Morgan Works for many years.

MECHANICS NORTH AND SOUTH.

Northern mechanics have abundant reason to be satisfied that the schemes of the traitors who are now endeavoring to destroy this Government have thus far proved abortive. This fact comes home to our mind with great force since we read in the Richmond papers reports of a workingmen's meeting held in that city, whereat measures were proposed to demand more wages, as the mechanics found it impossible to exist with the prices then ruling for food. It is nothing remarkable that men should do this, as it is of frequent occurrence among us; but the tone and spirit of the press toward the artisans, evidently dictated from official sources, shows sufficiently the animus of the authorities, and the feeling inherent in them toward all who get an honest living by toil. The Richmond *Enquirer*, in particular, is very severe upon the operatives and their assumption of rights and privileges, and asserts that when the issue is brought to a crisis between them and the government, that it will be much more likely to teach them their place than to grant any further concessions. In the face of such facts as these how is it possible for any Northern mechanic to sustain, either by argument or sympathy, those men who, were he in their power, would do him such grievous wrong?

Engines for Street Railroads.—Steam cars have been ordered for the Kensington and Frankford passenger railway, Philadelphia, and the first one has been put on the road.

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NEW BOOKS AND PUBLICATIONS.

PRACTICAL TREATISE ON LIMES, HYDRAULIC CEMENTS AND MORTARS, by Q. A. Gillmore, A.M. (Major-General at Charleston), published by D. Van Nostrand, 192 Broadway, New York.

There is perhaps less known, scientifically, respecting limes, cements and mortars, than any other substances or compositions in such general use. We therefore consider this treatise as a most valuable acquisition to scientific literature. Its range is extensive, and the information given practical and useful. It treats of the nature and composition of limes, cements, and mortars, and instructions are given respecting their preparation and application.

CEMENTS.—As foundation works of concrete and masonry under ground, or under water, such as piers, docks, &c., are of great importance, because costly and intended to endure for long periods, a large space is devoted to hydraulic cements. The Rosendale hydraulic cements are the most celebrated in the United States. They are so named from the fact that the stone was first discovered in the township of Rosendale, Ulster County, N. Y., on the opening of the line of the Delaware and Hudson Canal. They are mostly found within the limits of a narrow belt, scarcely one mile in width, skirting the northwest base of the Shawangwick Mountains in the valley of Roundout Creek. The beds are tortuous and twisted into a variety of complex shapes, but affording many accessible positions. The thickness of several layers of this deposit averages about forty-six feet, including several strata varying from four to twelve feet. Several manufactories of cement have been established in this region. This hydraulic limestone is burned in kilns and ground to powder, in which state it is furnished for use. Hydraulic cement deposits are also found in several other localities in the United States. Besides the American hydraulic cements, Portland cement and Parker's Roman cement are imported in moderate quantities from England. In Europe all the natural cements are called Roman cements, to distinguish them from the Portland cements, which are artificial combinations of chalky lime and clay. The Roman cement, made in France and England, is derived from argillo-calcareous kidney-shaped stones, called "septaria." They are gathered on the sea-shore after storms and high tides, and also found in some localities by digging, and are burned in kilns, then ground like the American cement. Pozzuolanas are hydraulic cements which have been used from time immemorial by the Italians for structures under water. They are not natives of the United States, so far as is known; being chiefly found in volcanic regions. They are usually mixed with sand and rich slacked lime, and form very superior hydraulic mortar. Some of the old Roman sea walls made with pozzuolana, appear to be as sound today as when erected two thousand years ago. Artificial hydraulic cement can be manufactured by thoroughly combining slacked lime with clay in suitable proportions, and burning the mixture in a kiln, grinding, and burning a second time. Several patents were taken out by American inventors, for making artificial hydraulic cements, before our rich natural deposits were discovered.

MORTAR.—In slacking common lime for making mortar, General Gillmore recommends that all the water required be poured on at once, and that the heap be covered until next day, and then be mixed with its proper quantity of sand; after which the mortar should be heaped up for future use. It is a common practice to slack the lime, mix it with sand, and apply it directly to walls, without allowing it time to rest for the substances to combine more intimately. Such mortar is generally deficient in adhesive qualities.

Information is also given in this interesting volume respecting the use of plaster and the modes of applying it; also in regard to pointing cements, the mode of preparing concrete, &c., but our space will not permit us to enter upon these subjects.

BIBLIOTHECA SACRA; Edited by Professors Park & Taylor; published by Warren Draper, Andover, Mass.

The number for the present quarter of this able theological Review, is interesting and instructive. The first article is on the pre-existence of the soul—a subject which has lately caused much sensation in New England. The author comes to the conclusion that the doctrine is not taught in the Bible. Another article, on the doctrines of the Episcopal Church, by Bishop Burghess, of Maine, is very valuable; and one on Constantine the Great and the fate of Paganism in the Roman Empire, is equally interesting.

FIRST OUTLINES OF A DICTIONARY OF THE SOLUBILITIES OF CHEMICAL SUBSTANCES, by Frank H. Storer, published by Sever & Francis, Cambridge, Mass.

Number two of this work (just out), ranges from letter C to O of the solubilities. Many persons would naturally infer that this was a dry production, useful only in the abstract to professional chemists. This is a mistake; it contains information respecting the agents and modes of dissolving all substances, and is a most instructive and useful work generally. The author possesses very extensive chemical information and research. Another part will complete the volume.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list:—

Cork cutting Machine.—This invention relates to cork-cutting machines in which patterns are used to determine the size and form of the corks. It consists first, in a novel system of clamps applied to confine the knives to the patterns, whereby a single pattern only is required in cutting any form of cork, instead of two, and much trouble is saved in adjusting the machine to cut various kinds of corks. And it consists, secondly, in so combining with each other the back spindle which holds the slab up to the pattern in the cutting operation, and a slide which works upon the rotating spindle, and has the cutters attached to it, by means of a lever controlled by suitable stops upon the back spindle, that a pressure upon the said lever in one direction will cause the back spindle to hold the slab up to the pattern and drive or feed the cutters into the slab, and a pressure upon the said lever in the opposite direction will first draw back the rear spindle and then draw back the cutters. Isaac Goodspeed, of Norwich, Conn., is the inventor of this improvement.

Fluting Machine.—This machine is intended to produce ruffles with a frill at both edges, or at one edge only, and with a series of plaits forming continuations of the flutes of the frill, but flattened to present the appearance of a band. The invention consists, first, in a novel combination of fluting rollers and an interposed presser or folding device, for the purpose of producing the frill or frills and flattened plaits at one operation. It consists, secondly, in the employment of a stripper operating between and in combination with the fluting rolls to detach the ruffle from the rollers in case of its adhesion thereto. It consists, thirdly, in the employment, in combination with the fluting rollers of a gage, to guide the strip of muslin or other material to the said rollers, in such a manner as to equalize and regulate the width of the frill or frills. It consists, fourthly, in a novel construction of the gage, whereby it is made to present the strip to the fluting rollers in a flat and smooth condition. It consists, fifthly, in the combination of fluted rollers, presser, stripper and gage or guide, for the manufacture of ruffles. It consists, sixthly, in the employment of a starching apparatus in combination with the fluting rollers and presser, to apply starch to one side of the flattened portion of the ruffle to enable the plaits to better retain their folded condition. It consists, seventhly, in certain means of delivering a thread to one surface of the plaits, in such manner that by the application of starch to the plaits the said thread may be caused to adhere to them and hold them together until they can be secured by stitching. And it consists, finally, in a certain mode of heating the fluting rollers by the flame of gas or of a lamp. Thomas Robjohn, of New York city, is the inventor of this improvement, which he has assigned to Emma C. Wooster, of the same place.

Oil Cup.—This invention consists in a novel system of valves applied in combination with a tube occupying a fixed position within the cup, whereby every time the steam is shut off from the engine a certain accurately regulated or measured quantity of grease, and no more is automatically supplied to the steam chest by being displaced by condensed steam, thus insuring proper lubrication of the valve as often as and at the very time required, without any waste. It also consists in furnishing the cup with an independent screw socket, which enables it to be adapted to any steam chest without putting the cup in a lathe to cut a screw thread upon its bottom. J. R. Fees, of 1,211 Butterwood street, Philadelphia, Pa., is the inventor of the above.

Pump Valve.—The object of this invention is to produce a valve for a steam pump or for any other cylinder pump, which gives easy access to the working parts and which is not liable to become leaky or stopped up by sediment or other impurities that may be contained in the water, during the operation of pumping. The inventor of this implement is J. W. Hopkins, of 44 Spencer street, Brooklyn, N. Y., and the whole right has been assigned to James Clayton, of No. 210 Fulton street, Brooklyn.

Platform Scales.—This invention relates to an improvement in platform scales which were patented November 11, 1862. The invention consists in an improvement in the levers which connect the platform levers with the scale beam, whereby the scale is rendered far more sensitive than hitherto, and the scale beam rendered capable of being placed at any convenient distance from the platform, so as not to be in the way of the load to be weighed, and the heavy loading of the platform, hitherto required in order to render the scale sensitive and accurate, entirely avoided. L. M. Severance is the inventor of this improvement. Mr. Severance's present address is East Middlebury, Vt.

Amalgamator.—This invention relates to an improvement in that class of amalgamators in which the finely pulverized ore is intimately mixed with the mercury by the action of a rotary muller in a suitable pan. The invention consists in imparting to the mullers, which are attached to arms extending from a common central arbor, a compound rotary or a sun and planet motion by the action of a central stationary-toothed rim on pinions secured to the axles of the mullers in such a manner, that by the rapid rotary motion of each muller around its individual axis, that portion of the ore which may be exposed to the action of said muller at a certain moment, is brought into intimate contact with the mercury, and by the common rotary motion of the several mullers around the central arbor, the entire contents of the pan are successively and repeatedly exposed to the action of each muller. The invention consists, also, in the arrangement of a set screw on one side and of a hinge on the opposite side of the pan, in such a manner that the position of the pan, and its inclination can be adjusted at pleasure. Thomas Hansbrow, of Sacramento, Cal., is the inventor of this improvement.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of our reception of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

Back Numbers and Volumes of the Scientific American.

VOLUMES I., II., III., IV., V., VII. AND VIII. (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artizan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOL. VI. is out of print and cannot be supplied.

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ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING OCTOBER 27, 1863.

Reported Officially for the Scientific American.

*** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

40,387.—Bomb Lance.—Oliver Allen, San Francisco, Cal.:

I claim the improved bomb lance, as having the perforated fire-proof or non-combustible diaphragm, a, and a wooden or combustible fuse plug, C, placed within it and arranged and combined with the fuse, D, and the guard chamber, b, thereof, substantially as described.

40,388.—Alloy of Copper, Zinc and Aluminum.—Julius Baur, New York City. Ante-dated Oct. 20, 1863:

I claim the within described composition or alloy produced by mixing together the ingredients herein specified, substantially as and about in the proportions herein set forth.

[This invention consists in an alloy made of copper, zinc, and aluminum.]

40,389.—Locomotive Boilers.—John Briggs, Louisville, Ky.:

I claim, first, The combination with a tubular-flued boiler of the water and steam drum, C, placed directly over the tube cylinder, in the manner and for the purposes set forth.

Second, The hollow stay bolts, M M, adapted and employed in the manner herein described to serve the combined purposes of strengthening the straight parts of the shell and admitting a draught of air from the front to the fire, when used in combination with the register, N, and all arranged in the manner herein described.

[By this invention the entire space within the barrel of a horizontal tubular flued boiler may be occupied by the tubes and a horizontal crown shell entirely dispensed with.]

40,390.—Trip Hammer.—John Briggs, Louisville, Ky. Ante-dated Oct. 11, 1863:

I claim, first, The employment or use of parallel rollers or bearings, K, interposed between the wedges, H, and hammer shaft, D, for raising the latter to variable hights in a directly vertical plane.

Second, The wheels, G, secured to the shaft, E, near the hammer shaft, D, and serving the combined purposes of cam and fly-wheels.

[By means of this invention the force of the stroke may be regulated with great facility, and as lateral pressure upon the hammer is avoided, it is caused to strike with greater precision. The torsional and vertical strain upon the driving shaft is reduced, by adapting the cam wheels to serve as fly wheels and placing them near to and on both sides of the hammer shaft.]

40,391.—Steam Boiler.—John Briggs, Louisville, Ky. Ante-dated Oct. 17, 1863:

I claim, first, A steam boiler composed of one or more main horizontal cylinders with two or more transverse cylinders projecting downward into the furnace or flues, when the said transverse cylinders are formed of unequal depth or width, so as to receive more direct and full contact of the products of combustion substantially as herein described: and this I claim whether the said transverse cylinders be connected to the main cylinders directly by means of the coupling, L L', or through the medium of water legs.

Second, The coupling, L L', constructed of two convex-plates, connected by bolts and flanges and employed in the manner and for the purposes herein set forth.

Third, The transverse steam drum or cupola, G, casing, H, and flues, I and J, arranged and employed in combination with the boilers, A A, in the manner and for the purposes specified.

[The principal object of this invention is to provide a large extent of heating surface advantageously disposed, without the use of internal or return flues.]

40,392.—Apparatus for Condensing Steam and Elevating Feed Water.—John Briggs, Louisville, Ky. Ante-dated Oct. 20, 1863:

I claim the deflected water-pipe, G', and steam pipe, E E, when combined with the exhaust port of a steam engine, in the manner and for the purposes herein specified.

[In this invention the exhaust steam from the engine is employed to elevate water to supply the boiler, and the said water mingling with the steam effects its instantaneous condensation, so as to constantly maintain a partial vacuum within the condensing chamber.]

40,393.—Apparatus for the Propulsion of Vessels.—John Briggs, Louisville, Ky. Ante-dated Oct. 11, 1863:

I claim, first, The combination of the smoke flues, F F, with the steam-pipes, I I, whereby the products of combustion from the furnace are mingled with the steam before the ejection of the latter beneath or upon the water, substantially as set forth.

Second, The revolvable or reversible pipes, G G, provided with horizontal mouths, H H, which may be presented in either direction so as to eject the steam either forward or backward as explained.

Third, The casings, K K, with apertures, k k', at front and rear in the described combination with the pipes, G H, for the purposes set forth.

[In this invention the steam from the boiler is mingled with the products of combustion from the furnace or other gases not subject to condensation, and the whole caused to act directly upon the water in which the vessel moves, so as to propel or turn her in either direction.]

40,394.—Apparatus for the discharge of Bilge Water and for the Ventilation of Vessels.—John Briggs, Louisville, Ky. Ante-dated Oct. 20, 1863:

I claim an apparatus substantially as described to be applied to the stern of a vessel for the removal of bilge water, steam, smoke, foul air or other fluids.

[By this invention the motion of a vessel is made to create a partial vacuum under the surface of the water, which may be employed to aid the exhaust of the engine or draft of the furnaces or carry off bilge water, foul air, or other fluids.]

40,395.—Harvester.—Robert Brown, Frederick, Md.:

I claim in combination with the angular side bars l, of the main frame, A, and the inner hinged frame, E, the two short wheel axles, K, when constructed and arranged substantially in the manner and for the purposes herein described.

I also claim in combination with the open guard fingers having spaces, m, under and to the rear of the cutting edges of the blades, the clearers, p, at the lower side of the blades when said clearers operate above the spaces, m, and when constructed and arranged substantially in the manner herein described.

40,396.—Explosive Projectile.—Thomas H. Burrowes, Chicopee, Mass.:

I claim, first, The arrangement within a projectile for ordnance, of alternate layers of gunpowder and of an inflammable material which is capable of setting fire to bodies on which it falls, substantially as herein specified.

Second, The perforated fuse tube, B, applied in combination with the two chambers, a and b, and the fuse shield, C, substantially as and for the purpose herein specified.

40,397.—Artificial Arm.—Edward Cotty, Washington, D. C.:

I claim, first, The elbow-joint, b b, when constructed substantially as described hereinbefore, with the rods, O O, and slides, s s t t.

Second, The ring, d, fastened to the straps, c c, surrounding and holding the lower portion, e, of hand, f, and allowing the latter to be turned around its axis, as specified above.

Third, The spring, l, around pin, m, in combination with cross piece, k, and disk, l, assisting the bending and stretching of the arm constructed and arranged as hereinbefore described.

Fourth, The disk, i, with the two curved guide holes, v v, for the reception of pins, u u, forming the bottom plate of rods, w w w, being constructed and arranged as shown in the several figures, and as described above.

Fifth, The rods, w w, moving the levers, x x, on the inclined axes, y and z, being adjustable on the bottom plate or disk, i, as described within, in combination with rods, & & S S, and levers, B B, arranged as specified and for the purpose set forth.

Sixth, The construction of my fork holder, w, consisting of four elastic laps, 1 2 3 and 4, and the screw, 5, for the purpose specified herein before.

40,398.—Lifting Shovel.—Wm. E. Davis, Brooklyn, N. Y.:

I claim the new article of manufacture substantially as described consisting of a combined shovel and lifter.

40,399.—Cooking Stove and Range.—Royal E. Deane, New York City:

I claim, first, The combination with a cooking range of a reversible grate, constructed and operated substantially as and for the purposes specified.

Second, The employment of an independant support for the top or hot plate, consisting of the cross bar or its equivalent, as described, when constructed essentially as set forth, and protected by a circulation of water within, substantially as and for the purposes specified.

40,400.—Flatform Scale.—Henry J. Drew, Dixon, Ill.:

I claim the employment or use of the levers, D D E, in combination with the levers, B B, arranged in connection with the platform frame, C, and scale-beam, F, substantially as and for the purpose herein set forth.

40,401.—Lantern.—Minor H. Fowler, New York City:

I claim, first, The spring catches, I constructed in the manner herein shown and described by slitting a strip of metal longitudinally, employing one side as the spring attachment, turning the other side up into form for the thumb piece and bending the connecting end into form for the catch or latch, so that the said latch, thumb-piece and spring attachment may all be formed of a single piece of metal as specified.

Second, The combination of the springs, I I, cylinder, e, and rock-shaft, G, with the band, D, and slot or opening, g, all in the manner herein shown and described.

[This invention relates to a novel construction of the lower part of the lantern, comprising the lamp and its base, whereby the expense in manufacturing the same is very materially reduced and proper air-spaces obtained to feed the flame or supply it with oxygen reduced.]

40,402.—Veneer Cutting Machine.—George Gardner, Clarksville, N. J.:

I claim the combination of the gate, F, sliding in a vertical plane between oblique guides, h i, and carrying the bolt, H; the bed or table, B, sliding horizontally on the side pieces, a a, the stock, C, formed with a throat, e, and attached to the forward edge of the table, B; and the knife, D, fixed obliquely in the stock, C; when all the said parts are constructed and arranged in the manner and for the purposes herein shown and explained.

[This invention consists in the employment or use of a reciprocating gate or frame placed between oblique guides, arranged in such a manner relatively with a knife or cutter that the veneers will be cut from the log or bolt with an oblique or drawing cut.]

40,403.—Steam Plow.—N. A. Gray, Cleveland, Ohio:

I claim, first, The arms, H', and blades, K, and M, when constructed and arranged substantially as specified.

Second, I claim the combination of the arms, H', as constructed, with the compound crank figure 5, as and for the purpose herein set forth.

Third, I claim attaching the arms, H', to the crank wrist, by means of the stationary stud, I, removable cutter, K, and wedge, L, or their equivalents, substantially as shown.

Fourth, I claim the drag, V V, constructed and operating substantially as specified.

40,404.—Churn.—T. F. Griffiths, Danville, N. Y.:

I claim the combination of the head, F', constructed as shown and described, with the head, G, and operating as and for the purposes set forth.

40,405.—Stove.—John Hafer, Bedford, Pa.:

I claim the combination of two or more right or oblique cones, the vertex of each cone being closed within the radiator, arranged substantially as described for the purposes set forth.

40,406.—Amalgamator.—Thomas Hansbrow, Sacramento, Cal.:

I claim, first, Imparting to the muller or mullers, C, a sun and planet motion in the manner and for the purpose substantially as described.

Second, The central stationary toothed rim, E, in combination with the rotary arbor, D, pinions, i, mullers, C, and pan, A, all constructed and operating substantially as and for the purpose set forth.

Third, The set screw, d, in combination with the hinged pan, A, constructed and operating as specified.

40,407.—Treating Waste Rubber.—C. H. Hayward, Stoneham, Mass., and Daniel E. Hayward, Melrose, Mass.:

We claim boiling waste rags of fibrous material and rubber in an acid or alkali, for the purpose of destroying the tenacity of the fibres of the rags so that the rubber may be reground and so that the material will not blister when reused, as described.

40,408.—Boots and Shoes.—Daniel E. Hayward, Melrose, Mass.:

I claim as a new article of manufacture, an india-rubber sole for boots and shoes that is to be sewed thereon, and that has a channel therein for the stitches to lie, and be protected in said channel being formed along the edge of the sole, by the molds in which it is formed and vulcanized, substantially as herein described.

40,409.—Heel Stiffener or Counter for Boots and Shoes.—Daniel E. Hayward, Melrose, Mass.:

I claim as a new article of manufacture a heel stiffener or counter of india-rubber and its compounds, which is shaped and vulcanized in the mold in which it is formed, and made and operating as set forth for the purpose described.

40,410.—Safety Attachment to Railroad Car Trucks.—Henry Holcroft & C. S. Smith, Chester Valley, Pa.:

We claim the employment or use of the shells or cases, E, attached to the truck, A, and provided with the boxes, F, and arranged in relation with the wheels, B, and axles, C, to operate as and for the purpose herein set forth.

[This invention relates to a new and useful attachment for railroad car trucks for preventing accidents in case of the breaking of an axle. The invention consists in the application of boxes to the truck so arranged as to partially enclose the wheels and to sustain the parts of a broken axle.]

40,411.—Composition for Oil Cloth.—Robert Hoskin, Brooklyn, N. Y.:

I claim a composition or plaster for oil cloth composed of whiting and ochre, or equivalent or analogous substances, in about equal proportions, and mixed to the proper or desired consistency with glue dissolved in milk.

[This invention relates to a new and improved composition for placing on canvas or cloth to receive the colors which are printed on the composition by means of blocks, and which fabric is commonly termed oil cloth, the same being used for floor cloths, table covers, and like purposes.]

40,412.—Device for holding Bits in their Sockets.—C. F. Hunter, Adrian, Mich.:

I claim a socket for holding boring tools constructed to operate with a sliding ring working in combination with a dog as described, said dog having inclined planes as above described and set forth.

40,413.—Invalid Bedstead.—Moses Johnson, Colebrook, N. H.:

I claim the invalid bedstead as made with the divided posts, A, and the separate mattress and sacking frames arranged and combined therewith, substantially as specified.

And in combination with the bedstead so made, I claim the auxiliary head and foot boards, B C, applied to the mattress frame, in the manner and so as to operate substantially as described.

I also claim the mode of making and applying the sacking, viz., in two parts, P q, one being applied to the elevator frame, and the other being fixed to the sacking frame and extending underneath the elevator, D, and hooked to and connected with the head board, d, as and for the purpose specified.

I also claim the combination of the tipping hooks, t t, or their mechanical equivalents, with the bedstead, and their windlass or shaft, F, the whole being constructed and so as to operate substantially as described.

40,414.—Cultivator Teeth.—W. H. Kelly, Lysander, N.Y.:

I claim the tooth, or, as it is sometimes called, the point, of the form and shape, and constructed essentially as above described.

40,415.—Stopper for Jars and Bottles.—A Kline, Philadelphia, Pa.:

I claim a stopple for fruit jars and bottles, consisting of the core, A, and the ring, a', constructed and arranged together in combination, substantially as described and set forth.

40,416.—Device for Releasing Animals from Stalls.—William Kloenne, New York City. Ante-dated October 10, 1863:

I claim the arrangement of a spring bolt, A, moving in a case, B, and catching in a socket, C, in combination with the slotted bar, F, and pin, b, constructed and operating as and for the purpose described.

The combination of a series of bolts, A, with pins, b, and slotted bars, F, provided with a handle, G, substantially as and for the purpose specified.

[An engraving and description of this invention will shortly be published in the SCIENTIFIC AMERICAN.]

40,417.—Artificial Leg.—Peter Lockie, Rochester, N. Y.:

I claim the employment or use of the adjusting lever or standard, f, fixed to the foot, in combination with a suitable spring or springs, for the purpose of regulating the position of the foot, B, substantially in the manner specified.

40,418.—Corn Planter.—A. S. Markham, Monmouth, Ill.:

I claim, first, The wheels, H, secured in the front part of the frame, G, by means of adjustable axes, e, in combination with the rotary coulters, S, and furrow shares, T, all arranged to operate as and for the purpose herein set forth.

Second, The particular arrangement of the furrow shares, T, with the coulters, to wit, the former having an oblique position relatively with the latter, so as to leave a V-shaped space between them, in which the seed-conveying tubes, P', are placed.

Third, Providing the plates, O, with perforations, m, substantially as shown, to admit of the escape of dust and fine foreign substances from the seed boxes, M.

Fourth, The self-adjusting scrapers, F, attached to the shaft, D, which is provided with a lever, E, and all arranged as and for the purpose set forth.

Fifth, Providing the lids, A*, of the seed boxes, M, with notches, a*, substantially as and for the purpose specified.

[This invention relates to a new and improved seed-planting machine of that class designed for planting seed in hills or drills. Its object is to obtain a machine which will plant the seed at an uniform depth, and, at the same time, prepare the earth in a proper condition to receive it. The invention also has for its object the obtaining of an efficient scraping device for the purpose of keeping the wheels of the machine clean. And further, it has for its object the obtaining of a means for admitting of the ready escape of dust and fine foreign substances from the seed boxes, as well as a simple and efficient device for dropping the seed in check rows.]

40,419.—Suspended.

40,420.—Tar Mop.—John W. Midwinter, Port Washington, N. J.:

I claim the mop when constructed and its parts arranged relatively to each other, substantially as specified.

40,421.—Pontoon.—T. J. Mayall, Roxbury, Mass.:

First, I claim the distending boat frame, the same consisting of a main frame and one or more swinging frames, the whole being constructed to operate together, as described.

Second, In combination with the main and swinging frames constituting a distending frame, operating substantially as set forth, I claim the longitudinal braces, arranged as herein described for stiffening the bottom, as specified.

40,422.—Wagon Standard.—O. E. Miles, Aurora, Ill.:

First, I claim a cast metal upright for vehicles, adapted to be secured against lateral and end movements upon the bolster, substantially in the manner and for the purpose herein set forth.

Second, I claim the specific arrangement of the several parts in the base of my said upright, the lip or flange being adapted to project down on both sides and at the end, and the part, a', being let into the top of the bolster, B, at some distance from the end, all as herein set forth.

40,423.—Corn Planter.—Paris Mills, Ridge Farm, Ill.:

I claim, first, The combination of the grooved roller, B, cutters, C C, seed boxes, F F, provided with the slide, G, and the covering rollers, M, all arranged as and for the purpose set forth.

Second, The hooks, I, secured to the inner side of the seed boxes, F, and arranged in relation with the seed slide, G, as and for the purpose herein set forth.

[This invention consists in the employment of a roller, cutters, a seed-dropping mechanism and covering rollers, all arranged and applied in such a manner that corn may be dropped with accuracy and with great facility, and the machine at the same time be under the complete control of the operator.]

40,424.—Plaiting Machine.—G. C. Nelson, Petersham, Mass.:

I claim the combination of the plaiting former and its series of plaiting jaws, the whole being arranged in manner and so as to operate together, substantially as described.

And I also claim the combination of the elevating frame, or its equivalent, with the plaiting jaws and their former.

40,425.—Sled.—S. E. Oviatt, Richfield, Ohio:

I claim the use of cast-iron sled knees, having pipe sockets in the upper parts thereof for the reception of the ends of the sled beams, when constructed and arranged substantially in the manner and for the purposes herein described.

40,426.—Shirt Bosoms.—J. A. Pease, New York City:

I claim a shirt bosom, water-proof enameled, with springs to keep it in position, substantially as and for the purpose described.

40,427.—Harvester.—W. P. Penn, Jacob Geiss and Jacob Brosius, Bellville, Ill.:

We claim, first, In combination with the main frame, the segmental plate, a, and screw, b, when arranged in respect to said frame, to each other and to the main shaft, as shown and described for the purpose specified.

Second, We claim the screw, O, in combination with the bracket, I, and division board or bar, and the socket, N, for the purpose of rais-

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ing and lowering the platform and out end of the finger bar, as shown and described.

Third, We claim making the socket, N, with a broad out end, and with cavities therein for the purpose of shifting the position of the arms, P, of the caster wheel, R, by which the out end of finger bar and platform can be raised or lowered, as shown and described.

40,428.—Plumb Level.—W. H. Polleys and D. D. Polleys, La Crosse, Wis. :

We claim the wheel, fig. 3, with the socket constructed, arranged and operating in the manner set forth.

40,429.—Fire-proof Paint.—G. W. Powell, M. D., Chinese Camp, Cal. :

I claim the compound for making fire-proof paint in the manner herein described.

40,430.—Canceling Postage Stamps.—William Rayner, Brooklyn, N. Y. Ante-dated Oct. 14, 1863 :

I claim a canceling stamp composed of a pair of outer rings, provided with male and female letters, within which rings are arranged a punch or punches, a series of changeable types, and an elastic pressure pad, all operating together as herein set forth, for the purpose specified.

[The object of this invention is to obtain a simple and efficient implement by which postage and other stamps may be canceled in a much more expeditious manner than by the ordinary process of writing upon them.]

40,431.—Method of Attaching Carriage Wheels.—J. H. Reimkasten, Franklin Grove, Ill. :

I claim a divided nut, constructed and applied substantially as described, to confine the arm, C, within the box, A, when used in combination with screws or bolts, d, to secure the divided nut upon the collar, and with a screw, d′, to prevent the turning of the nut within the box.

[This invention affords very convenient and efficient means of securing, removing and lubricating carriage wheels and confining the lubricating material.]

40,432.—Percussion Cap Primer.—E. D. Seely, Brookline, Mass. :

I claim, first, Combining the cap chamber with a sliding cover or lid instead of the case heretofore used, whereby the instrument is improved and its cost diminished, as set forth.

Second, Combining the follower and its spring cord with the cover, so that the cord will not interfere with putting the caps in broad end downward, as described.

Third, Placing the ribs, against which the flanches of the caps rest, at the bottom instead of at the top or open side of the chamber, whereby flanched caps are prevented from flying or falling out when the magazine is open, as described.

Fourth, In combination therewith, I claim cutting off the rear ends of the ribs for holding the flanched caps, to admit the introduction of the flanches under the ribs, as described.

Fifth, Combining two magazines together by the use of a common cover, having a ring for suspending the instrument, as described.

40,433.—Lubricator.—J. R. Sees, Philadelphia, Pa. Ante-dated, Oct: 10, 1863 :

I claim, first, The construction of a grease cup to effect the supply of grease in a measured quantity every time the steam is shut off from the engine, by displacing such quantity from the cup by a quantity of water resulting from the condensation of steam which is admitted to the cup by the act of letting on steam to the engine, substantially as herein described.

Second, The valves, F and G, and tube, D, applied in combination with each other and with the cup, substantially as and for the purpose herein specified.

Third, The tube, D, and nut, a, applied substantially as described, to serve as a means of connecting the different parts of which the cup is composed

Fourth, The atmospheric valve, H, applied in combination with the cup, substantially as and for the purpose herein specified.

Fifth, The independent screw socket, E, applied in combination with the cup, substantially as and for the purpose herein set forth.

40,434.—Platform Scales.—L. M. Severance, Dixon, Ill. :

I claim the two levers, E E, in combination with the two pairs of levers, B, all arranged and connected to each other and to the scale beam, G, substantially as and for the purpose herein set forth.

40,435.—Grain Drill.—B. F. Smith, Unity, Iowa :

I claim, first, The shaft, B, provided with seed sills, b, in combination with the slide, D, partition plates, I I, provided with holes, g, and vibrating plate, G, provided with spurs, e, and operated through the medium of the cam, H, all arranged as and for the purpose set forth.

Second, The combination of the tooth frame, J, with draught bar, M, attached, and the draught pole, K, when arranged as shown, and applied to the machine to operate in the manner as and for the purpose herein specified.

[This invention consists in the employment of a rotating cylinder provided with seed cells and placed longitudinally within a proper seed box, in combination with a gage slide and a reciprocating stirrer, all arranged to operate in such a manner as to insure the proper discharge of the seed, and effectually prevent choking and clogging. The invention further consists in a novel and improved arrangement of a drill frame and the draught hole applied to the machine, and arranged to operate in such a manner that the drill frame may be set so as to have its teeth penetrate a greater or less distance into the ground, the horses relieved of downward pressure on their neck, the device nicely balanced on its wheels, and the teeth readily raised above the surface of the ground when required.]

40,436.—Fruit Basket.—Oren Stoddard, Busti, N. Y. :

I claim the herein described construction of basket and cover, wherein one end of the splints are secured between disks, and the other end between hoops, which form a rabbet in the top of the basket, and a corresponding rabbet in the cover, which fit together, as described, and as a whole, having the form and structure herein set forth, and operating as and for the purposes specified.

40,437.—Spoke Shave.—Melzer Tuell, Penn Yan, N. Y. :

I claim the stock, A, and cutter, B, when constructed and arranged as and for the purpose set forth.

Second, I claim the adjustable gage, C, when made and used as specified.

40,438.—Wood-sawing Machine.—W. S. Veber, Perrysburgh, Ohio :

I claim, first, the levers, E, palls, F, and ratchet wheels, D, in combination with the crank wheel, J, and saw sash, P, the several parts being constructed and operating as and for the purpose specified.

Second, I claim the rollers, T T, in combination with the saw sash, P, when arranged and operating as and for the purpose described.

Third, I claim the break pulley, V, and lever, W, in combination with the cord, Q, and frame, O, for the purpose herein set forth.

40,439.—Lamp Burner.—C. C. Warwick, Philadelphia, Pa. :

I claim having the perforated ring, D, which incloses the wick tube, made separate and independent of the burner, and arranged to operate as herein shown and described, so that said ring can be lowered at pleasure, and the wick tube thus exposed on all its sides, all as set forth.

[This invention relates to an improved lamp burner of that class in which a draught chimney is used, and consists in constructing the burner with a tubular slide arranged in such a manner that when the burner is in use, the wick tube, by elevating the slide, will be entirely inclosed within the burner, and when it is designed to light the wick, the slide, by being lowered, will expose the wick tube, and thereby admit of the wick being lighted without removing the chimney from the burner, or without elevating or moving the chimney the least.]

40,440.—Horse Collar.—Edward Whitney, Albany, N. Y.:

I claim the arrangement of a metallic plate placed on each side of the shoulder piece, and connected either to the collar or hames, substantially as and for the purpose specified.

40,441.—Slide Valve for Steam Engines.—M. H. Barnes (assignor to himself and A. S. Norton), Peoria, Ill. :

I claim regulating the pressure and friction of a slide valve upon its seat, by changing the area of atmospheric exposure of the working surface of the balancing valve, substantially as herein described.

[By this invention the pressure and friction of the valve upon its seat are placed under complete control of the engineer, and may be regulated as required by the adjustment of an external valve or register without opening the valve chest.]

40,442.—Loom.—Jesse D. Cottrell (assignor to Ebenezer D. and George Draper), Milford, Mass. :

I claim the combination for operating the train of gears of the warp beam, the same consisting of the radial arm, F, and its pinion, G, the lever pawl, I, and its retainer, N, the retaining pawl, M, the depresser, O, and the rocker lever, K, the whole being applied to the lay and the warp guide, substantially as and so as to operate as described.

I also claim the combination and arrangement of the two arms or levers, u x, and their pitman, Z, with the spring, s, and the warp guide, D. Also the combination therewith of the toothed racks or their equivalents to receive and hold the pitman and admit of its adjustment for the purpose set forth.

40,443.—Crutch.—Lucius Crandall, Plainfield, N. J., assignor to himself and Eliphalet Lyon, New York City :

I claim, first, An arm-piece, A, having its center part, f, made narrower than the ends, g, as and for the purpose shown and described.

Second, The combination of the two jaws, h i, of an arm-piece, A, as described, so that when the jaws are drawn together, they take in and fasten the covering of the arm-piece.

Third, The hollow molded or cast hand piece, B, with sleeves, b, as shown and described.

Fourth, The employment or use of a segmental tapering bush, c, in combination with the sleeve, b, of the hand-piece, B, and with the staff, all constructed and operating in the manner and for the purpose substantially as specified.

Fifth, The cast or molded socket, D, bottom-piece, E, and screw, d, in combination with the staff or staves of a crutch, constructed and as and for the purpose set forth.

[This invention relates to an improvement in the arm-piece, the hand-piece and the foot or socket and bottom-piece of a single or double crutch, and to the peculiar means employed for fastening and operating adjusting the hand-piece on the staff or staves.]

40,444.—Cork-cutting Machine.—Isaac Goodspeed, Norwich, Conn. (assignor to himself, A. A. Goodspeed, E. S. Stebbins and A. Newbury) :

I claim, first, The clamps, L L, arranged on pivots, h h, and applied to the rotating and sliding cutters directly opposite to the pattern, substantially as and for the purpose herein specified.

Second, Combining the clamps with the disk, G, or its equivalent by means of levers, M, studs, N, and set screws, j j, substantially as and for the purpose herein specified.

Third, Combining the back spindle, E, with the disk or slide, H, with which the cutters are connected, by means of a lever, P, whose operation is so controlled by stops as to operate the said spindle and the said disk or slide, substantially in the manner herein specified.

40,445.—Valve for Steam Engines.—J. W. Hopkins (assignor to himself and James Clayton), Brooklyn, N. Y.:

I claim the combination with the steam-chest, C, and the valve, D, of the independent oscillating hollow disk and slide-valve, B A, all constructed and operating together in the manner herein shown and described.

[This invention relates to an improvement in that class of steam valves in which the motion of the valve is partially effected by the action of the steam, so that the ports are wide open when the piston has arrived at either end of the cylinder, and the full force of the steam acts on the piston throughout its whole stroke.]

40,446.—Sewing Machine.—L. W. Lathrop and W. P. De Sanno (assignors to themselves, W. H. Meyers and John McDowell), Philadelphia, Pa.:

We claim, first, The slotted circular grooved cup, E, with hook, F, permanently attached to the outside surface, constructed and operating substantially as described.

Second, The under-take-up, J, which revolves with the cup for extending the loop and liberating it from hook, F, constructed and operating substantially as described.

Third, The reciprocating holder, O O′ O″, arranged and operating substantially as described.

Fourth, The combination of the slotted circular grooved cup, E, and its hook, F, with the spool-case and frame, L N, the under-take-up, J, and the reciprocating spool-case holder, O O′ O″, the whole constructed and operating substantially as described.

40,447.—Pump Valve.—J. W. Hopkins (assignor to himself and James Clayton, Brooklyn, N. Y.:

I claim the arrangement of the independent oscillating valves, B B′, constructed as set forth, with the partition, b, case, A, and the several water-ways, all in the manner herein shown and described.

40,448.—Harvester.—James Pine, Troy, N. Y., assignor to himself and W. A. Wood, Hoosick Falls, N. Y.:

I claim, first, A vertical frame, A, for carrying and supporting the gearing, substantially as described.

I also claim hanging the gear wheels upon stationary pins or studs attached to the vertical frame, A, so that I may dispense with all rotating shafts and journal boxes or bearings, substantially as described.

I also claim, in combination with the vertical frame, A, the hinged bar, J, and the rigid bar, G, both serving the purposes herein described and represented.

I also claim, in combination with the hinged and rigid bars connected therewith, the former carrying the tongue, and the latter the drag-hook, w, a lever on one and an arm on the other, so that the cutting apparatus may be raised up, held up and supported or let down at pleasure, substantially as described.

40,449.—Coal sifter.—W. W. Stevens (assignor to N. P. Richardson & Co.), Portland, Maine :

I claim the combination of the two motions—reciprocating, rotary and rocking motion—as applied to a coal sifter, the first motion being obtained by moving the handles, A A, from left to right or right to left, the second motion by turning the handles, A A, up and down, giving the rocking motion.

40,450.—Churn.—G. L. Witsil (assignor to himself and Clement Cresson), Philadelphia, Pa.:

I claim, first, The reservoir, A, perforated dasher, D, and detachable perforated board, F, the whole being formed, arranged and operating substantially as and for the purpose specified.

Secondly, The pin, E, so fitted to the reservoir as to form a plug, and arranged in respect to the vibrating dasher as described, for the purpose set forth.

RE-ISSUES.

1,553.—Device for Raising and Forcing Water by Steam.—Abel Brear, Saugatuck, Conn. Patented April 1, 1862 :

I claim the combination of the steam or air pipe, A, terminating in a nozzle of cylindrical or nearly cylindrical form, the open socket, C, and delivery-pipe, D, substantially as and for the purpose herein specified.

[This apparatus consists principally of a steam pipe, the mouth of which enters and is surrounded by a socket in which is an opening for the admission of the water or other liquid to be raised, from the well, reservoir or other source of supply, and from which a delivery pipe leads to the point where it is to be delivered, the direction of the steam pipe being the same as that of the contiguous portion of the delivery pipe. The issuing steam expels the water from the delivery pipe, and the place of the water so expelled is supplied by water forced up into the socket from the well, reservoir or other source of supply, by pressure of the atmosphere.]

1,554.—Grain Separator.—M. J. Barcalo, Tuscarora, N. Y. Patented June 23, 1863 :

I claim the combination of the plate, f, with the open mesh-screen, B, arranged and operating substantially as and for the purpose herein set forth.

In combination with the screen, B, provided with the plate, f, I also claim the separating plate, D, for the purpose of catching and discharging the foreign seed, substantially as described

1,555.—Circular Knitting Machine.—John Pepper, Holderness, N. H. Patented Dec. 5, 1854 :

I claim the sliding detached needles, in combination with a cam or its equivalent for operating two, three, four or more of them at one and the same time, substantially as described.

Second, I claim the series of ribbing needles in combination with the plain needles of a circular knitting machine, operating in the manner substantially as set forth for the purpose specified.

Third, I claim making a part of the cam or lip which actuates the ribbed needles removable, for the purpose of introducing and withdrawing the needles, as set forth.

Fourth, I claim making a part of the lip of the cam-plate adjustable for the purpose of varying the length of the stitches as required.

Fifth, I claim inclining the plane of one series of needles to the plane of rotation of the other series, for the purpose set forth.

1,556.—Apparatus for Making Ruffling.—Emma C. Wooster (assignee of Thomas Robjohn), New York City. Patented July 21, 1863 :

I claim, first, The combination of two pairs of rotating fluting rollers, and an interposed presser, to operate substantially as and for the purpose herein set forth.

Second, The combination with the two pairs of fluting rollers of an interposed stripper, operating substantially as and for the purpose herein specified.

Third, The combination of the two pairs of fluting rollers and a gage to guide a strip of muslin or other material to both pairs of rollers, substantially as and for the purpose herein specified.

Fourth, The flat tubular guide, J, constructed with two slits, i i, and a tongue, J, substantially as and for the purpose herein set forth.

Fifth, The combination of two pairs of fluting rollers, a presser, a stripper and a guide, to operate substantially as herein set forth.

Sixth, The combination with the guide for conducting the strip of muslin or other fabric to the fluting rollers, of a starching roller, K, and a pressure roller, L, applied and operating substantially as herein specified.

Seventh, The employment of a thread conductor, m, applied and operating substantially as herein specified, in combination with the fluting rollers and presser, for the purpose herein set forth.

Eighth, The employment of a gas burner or lamp and chimney, having the fluting roller shafts entering the chimney, substantially as and for the purpose herein set forth.

1,557.—Repeating Fire-arm.—Rollin White, Springfield, Mass. (late of Hartford, Conn.) Patented April 3, 1855 :

I claim, first, A breech-piece projecting from the face of the recoil shield opposite to the stationary barrel, substantially as described, in combination with the rotating cylinder, having the chamber extended through the rear, as and for the purpose herein specified.

Second, A non-rotating, oblique surface, arranged in rear of, and in combination with, a rotating cylinder, having its chambers extended through its rear, substantially as herein described, for the purpose of forcing forward the cartridges to their proper positions in the chambers.

Third, The spring-protecting plate applied and operating substantially as specified, at the rear of the cylinder, to protect the charges from the effects of lateral fire from the chamber in line with the barrel, in combination with a rotating chambered cylinder, having the chambers extended through the rear, substantially as described.

[This invention consists principally in the employment of a non-rotating breech or recoil shield, in combination with a stationary barrel and a rotating cylinder, having the chambers extended through its rear, for the purpose of covering the whole or a portion of the rear end of the cylinder, to prevent the charges or cartridgecases from slipping out from the chambers in a rearward direction, and to form an abutment to resist the force of the charges.]

1,558.—Repeating Fire-arm.—Rollin White, Springfield, Mass. (late of Hartford, Conn.) Patented April 3, 1855 :

I claim the non-rotating breech or recoil shield, in combination with a stationary barrel and a revolving cylinder, having its chambers extending through the rear end thereof, substantially as and for the purpose herein described.

I also claim the rotating cylinder, having cylindrically-formed chambers extending entirely through it, in combination with a stationary barrel, substantially as herein described.

[This invention relates to improvements in that class of fire-arms in which the charges or cartridges are inserted in a series of chambers formed in a cylinder, which is rotated that the charges may be brought in succession in line with a fixed barrel there to be fired. And it consists in combining with the cylinder of such an arm, having the chambers extending through the rear end thereof, a breech-piece projecting forward of the face of a fixed or non-rotating recoil shield, and behind the barrel, for the purpose of keeping the charge or cartridge case which is in that chamber of the cylinder for the time being in line with the barrel, in position during the discharge, giving support to the said charge or cartridge case in firing, and preventing the cartridge or case from swelling or projecting out at the rear, so that it shall not interfere with the rotation of the cylinder by rubbing against portions of the recoil shield which are in line with the barrel It also consists in combining with a revolving fire-arm having a rotating cylinder with the chambers extending through the rear end thereof, a non-rotating surface arranged in rear of the cylinder in a position oblique to the plane of the rear end of the said cylinder, for the purpose of forcing the cartridges foward in the chambers as their butt ends are brought in contact with such oblique surface by the rotation of the cylinder. And it further consists in combining with such a cylinder a spring projecting plate arranged between the recoil shield and the cylinder, having the chambers extending through for the purpose of protecting the charges contained in the adjacent chambers from the effects of the fire, if any should escape laterally from that chamber which is discharged in line with the barrel.]

1,559.—Repeating Fire-arm.—Rollin White, Springfield, Mass. (late of Hartford, Conn.) Patented April 3, 1855 :

I claim, first, The arrangement of the magazine and charging tube, substantially as herein described, for supplying cartridges to the chambers, as set forth.

Second, Combining the rotating chambered cylinder with the charging piston or its equivalent, in the manner substantially as herein set forth, whereby in the operation of retracting the said piston or equivalent after charging a chamber of the cylinder, the cylinder shall be rotated to the extent required to bring a new chamber in line with the barrel.

Third, Combining the hammer with the charging piston in the manner substantially as herein described, so that by the operation of moving the charging piston to drive a cartridge from the magazine into the chamber, the hammer shall be raised to cock the lock as set forth.

EXTENSION.

Construction of Iron Stairs.—B. F. Miller, New York City. Patented Oct. 23, 1849:

I claim constructing stairs in sections composed of the bent lever and under brace connected together, as shown in Fig. IV, the tread and brace being part and parcel or continuous with the balusters, the one bent at right angles, the other at the requisite angle for the brace.

I also claim the bent levers, as hereinbefore described, in combination with the rail either continuous or in sections attached to the end of the long arm of said lever, together with the under brace attached to the angle or bend of the short arm of said lever.

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Jacquard Looms.—E. B. Bigelow, Clintonville, Mass. Patented Oct. 23, 1849:

I claim, first, Giving to the jacquard frames of jacquard looms, working by power, a separate organization, that is giving the various motions of the jacquard by a shaft or shafts within or making part of the jacquard in contradistinction to the weaving loom, but receiving motion from the loom or from some first mover governed by or working in unison with the loom, substantially as described and for the purpose specified.

Second, I claim the method of adjusting the jacquard frame relatively to the weaving loom, substantially as described, so that the attendant can, from a given point, make the adjustment to suit the condition of the harness, as described.

Third, I claim taking the motions for operating the picker staves, and the apparatus for shifting the shuttle boxes from a shaft or shafts placed above and in combination with the pendulous frames which carry the shuttle boxes, substantially in the manner and for the purpose specified.

And, lastly, I claim, in combination with the power loom, a reversing motion, substantially as described, so that after the driving power has been removed and the momentum of the moving parts arrested, the attendant may set in motion the reversing motion, and drive the loom in the reverse direction to bring the parts to the position required for re starting, substantially described.

NOTE.—The number of patents issued from the United States Patent Office last week and reported above is eighty. Of this number *thirty-three* (nearly one-half) were obtained through the Scientific American Patent Agency.

IMPORTANT TO INVENTORS.

PATENTS FOR SEVENTEEN YEARS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent free of charge. Address MUNN & CO., No. 37 Park Row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model of drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical productions he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

The revised Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from $30 to $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents or new inventions in the United States and all foreign countries has been conducted, by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by inventors throughout the country we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters &c.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park Row, New York.

Notes and Queries

R. P. J., of N. Y.—Francis Vieta, the celebrated French mathematician, was born in 1540 and died in Paris in 1603. He is considered one of the principal founders of mathematical analysis, and is the author of the use of letters as symbols of quantities in algebra; he was also a celebrated decypherer, having decyphered the communications of the Spaniards, although composed of 500 different characters. The Spaniards attributed his success to magic. He was an extraordinary character, and his works have been edited in one folio volume.

A. A. B., of N. Y.—Various plans have been proposed to us for raising piles sunk in harbors to obstruct navigation; and plans have also been proposed to destroy chain cables thrown across the channels of harbors.

T. R. G., of N. J.—It is true that water boils at a temperature of 212° under atmospheric pressure, but it vaporizes at all temperatures above the freezing point. Men, professedly scientific, frequently commit a mistake in writing about steam, respecting this fact, and confound the evaporative with the boiling point of water. The boiling point depends entirely upon the pressure, and other circumstances. For example, water boils at 2° higher temperature in a glass than in an iron vessel; and if there is oil present on the top of the water, the boiling point is also raised a few degrees higher. And in a glass vessel coated inside with shellac varnish the water rises to 221° before it boils. Under all ordinary circumstances, however, 212° is the boiling point of fresh water exposed in an open vessel at the level of the sea. The boiling point of water is also elevated by the addition of saline substances, as ocean water boils at 224°—12° above fresh water.

R. B., of N. Y.—Dilute your thick carmine ink with aqua-ammonia, and it will then flow freely in writing. Carmine ink is made with carmine, a little gum arabic and aqua ammonia.

W. A. McP., of Ohio.—Our caustic soda (so far as we have been able to ascertain) that is used in the refining of petroleum is all imported. It is manufactured by boiling the carbonate of soda with freshly-slacked lime, permitting the sediment to settle to the bottom of the vessel, then concentrating the clear liquid until it crystallizes. You may make your own caustic soda in liquid by dissolving the crystals of soda in water, then stirring and boiling about the same weight of lime in the liquor. The carbonic acid of the soda will unite with the lime and form common chalk, which will fall to the bottom of the vessel; the clear liquor left on the top is caustic soda.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Oct. 28, to Wednesday, Nov. 4. 1863:—

G. M., Jr., of Ill., $16; J. W. M., of N. Y., $32; H. K. J., of Conn., $16; A. H. A., of N. Y., $54 20; G. S., of N. J., $10; B. & M., of N. Y., $10; O. P., of Vt., $41; M. & H., of N. Y., $16; W. S., of N. Y., $20; W. H., of N. Y., $20; J. E., of N. Y., $46; G. W. W., of Pa., $20; J. D. C., of Ill., $20; E. K. B., of Mass., $22; L. C. W., of N. Y., $25; T. K. A., of Ill., $25; J. C., of Iowa, $25; J. G., of R. I., $16; C. J., of Conn., $16; G. R., of Ky., $40; E. E. C., of Ill., $26; J. C. C., of Ill., $25; T. G. B., of Ohio, $25; L. D. B., of Ind., $14; J. D. H., of Pa., $10; J. T., of N. Y., $56; D. B. C., of N. Y., $44; S. R., of N. Y., $20; C. C., of N. Y., $20; H. S., of N. Y., $16; L. & B., of Ohio, $20; J. A. D., of N. Y., $10; H. H. E., of Conn., $16; J. F. H., of Mich., $45; K. & L., of Ohio, $45; C. B., of Iowa, $20; G. R. W., of Conn., $20; W. S. A., of N. Y., $16; C. S., of N. Y., $16; A. S. L., of N. Y., $20; S. D. G., of N. Y., $20; H. & G., of Ill., $20; E. H. G., of N. Y., $20; H. T. L., of N. Y., $16; A. K., of N. Y., $16; H. L. P., of N. Y., $391 10; C. F., of Ill., $20; G. S., of N. Y., $20; L. K., of Conn., $26; J. W., of Iowa, $15; E. D. A., of Canada, $16; M. F., of Conn., 15; B. & H., of Conn., $28; R. D. of Pa., $25; J. G., of Ill., $16; J. E. T., of Mass., $25; S. E. T., of Wis., $26; L. H. W., of Mass., $50; T. G., of N. Y., $16; J. S. B., of England, $25; J. B. A., of Ill., $25; L. W. M., of N. Y., $25; C. J. P., of Ill., $11; T. W. W., of Ill., $16; G. S., of N. J., $10. A. M. G., of Mo., $20; J. F., of N. Y., $25: B. L. & Co., of W. Va., 80; G. D. H., of Ill., $26; T. & Bros. of Wis., $26; J. B. H., of R. I., $25; T. G. E., of N. Y., $250; J. M. G., of Ill., $25; A. E. H., of N. Y., $16; W. H., of N. Y., $20.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgement by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Oct. 28, to Wednesday, Nov. 4, 1863:—

J. S. B., of England; B & H., of Conn.; T. K. A., of Ill.; E. E. C., of Ill., L. C. W., of N. Y.; W. B. R., of Mass.; S. E. T., of Wis.; J. C. C., of Ill.; J. C., of Iowa; J. B. A., of Ill.; L. W. M., of N. Y.; J. C. B., of Conn.; R. D., of Pa.; J. F., of N. Y; T. G. B., of Ohio; J. E. T., of Mass.; A. M. G., of Mo.; G. D. H., of Ill.; T. & Bros., of Wis.; J. B. H., of R. I.; W. R. T., of Cal.; J. M. G., of Ill.; L. C., of Conn.; J. E., of N. Y.; D. B. C., of N. Y.; J. A. D., of N. Y.; W. C., of England; O. P., of Vt; H. H. E., of Conn.; W. S. A., of N. Y.; L. H., of N. Y.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

STEAM CULTIVATION.—A CARD TO CAPITALISTS or Manufacturers of Steam Machinery.—The importance of the application of steam to agriculture has never been so strikingly apparent as at the present period in the history of our country. For when we take into consideration the fact that "grim war" has taken from the vineyard the keeper, from the field the laborer, and commanded them to go forth to do battle, and from whence alas but too few will ever again return to their peaceful avocations upon the farm, and thus leaving the vast agricultural regions of the great West almost destitute of laborers, we are the better enabled to understand the present need of applying the iron arms and fingers of steam machinery to the common labors of the farm. Indeed, the brass and iron muscles of the steam engine must fill the mighty vacuum in field labor which the present war has occasioned. Therefore, the party who will now introduce a practical system of "tilling the soil by steam," must realize a fortune, the certainty and magnitude of which it will require no special gift of prophecy to foretell.

Having now about completed my experiments, in which I have been engaged for the past three years, upon the rotary principle of plowing, sowing and harrowing by steam, as well as in that of the Rotary Ditching Machine, which is to be operated by the engine of the steam plow, I am fully satisfied that the complete success of my system of steam cultivation, is now only a question of time and capital. And of this fact I think I can convince any party who has any knowledge of mechanics.

But lacking the capital necessary for the building of my machinery and its introduction into use, I now desire to associate myself with some enterprising capitalist, or with some established machine manufactory, who is willing to advance the means requisite to the building and introducing of the Steam Plow and its various connections.

PROPOSITION.—The proposition I have to make to either of the parties above named, is this; viz: If the capitalist will advance $7,000 wherewith I may proceed to build and complete my first set of machinery, I will assign to him an equal one half interest in any present patent and in the patents of all subsequent improvements which I may make upon both the Steam Plow and the Ditching Machine. And in doing this, I will guarantee to him the success of my plans; and to secure which, I will execute to him a mortgage on my plantation of 248 acres—finely improved—2½ miles below Paducah on the Ohio River, and on all the stock, farm implements and personal property thereto in any wise pertaining, the cash value of which is about $13 000. This mortgage shall be based upon these express conditions, viz: Should my said machinery fail to perform in the practical and satisfactory manner represented, then, on the first day of November, 1864, I am bound to pay back the $7,000 with interest 6 per cent. from date of transaction. But should it prove positively successful in its operations, said mortgage to be annulled, and the $7,000 advanced to entitle him to the equal one-half interest in the enterprise as aforesaid. And for the future, I to place my time and my inventions against his capital, and the profits arising therefrom to the full extent of the patents, to be equally divided.

To any manufacturer who will agree to build the machinery and furnish me with $2,500 cash, wherewith to pay my incidental expenses attending its construction and introduction before the public, I will give a like interest, and execute a like mortgage on the aforesaid property, binding myself to pay back the said $2,500, and the cost of the work done, with the same interest, and at the same time as above mentioned.

The best of reference will be given, and full particulars communicated with plans, &c., by a letter addressed to Post-office Box 22, Paducah, Ky.

Ashland Farm, Ky., Oct. 25, 1863. 20 1

PATENT SOLID EMERY WHEELS.—THE NEW YORK Emery Wheel Company, after a long series of experiments have so perfected the method of manufacture of their improved wheels as to be able in future to fill promptly all orders for wheels in quantities. Our invention is pronounced by all who have used our improved wheel to be superior in every respect to any method heretofore known for combining emery for cutting, grinding or polishing purposes. Emery hones, knife sharpeners, &c., constantly on hand. Send for circular and price list. Office No. 51 Beekman street (up-stairs), New York. 20 3*

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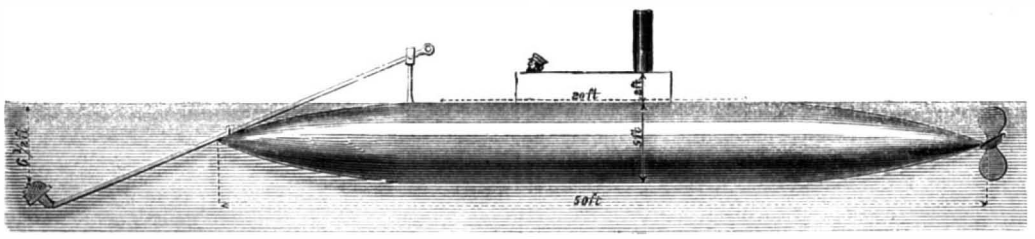
THE ATTACK UPON THE "NEW IRONSIDES."

Through the favor of the Ordnance Department we have received plans of the rebel steamer which attempted to destroy the *New Ironsides*, but which was herself discomfited; the annexed engraving is an accurate representation of the craft; the details of her construction are not important. The attack and the events immediately preceding it are thus related by the Charleston *Mercury*:—

"The torpedo steamer *David*, with a crew of four volunteers, consisting of Lieut. Wm. T. Glassell, J. H. Toombs, Chief Engineer, and James Sullivan, fireman of the gunboat *Chicora*, with J. W. Cannon, Assistant Pilot of the gunboat *Palmetto State*, left South Atlantic wharf between six and seven o'clock on Monday evening, for the purpose of running out to the *Ironsides*, exploding a torpedo under that vessel near amidships, and if possible blow her up.



The weather being dark and hazy, favored the enterprise. The boat, with its gallant little crew, proceeded down the harbor, skirting along the shoals on the inside of the channel until nearly abreast of their formidable antagonist, the new *Ironsides*. They remained in this position for a short time, circling around on the large shoal near the anchorage of the object of their visit. Lieut. Glassell, with a double-barreled gun, sat in front of Pilot Cannon, who had charge of the helm. Chief Engineer Toombs was at the engine, with the brave and undaunted Sullivan, the volunteer fireman, when something like the following conversation ensued:—

Lieut. Glassell—"It is now 9 o'clock. Shall we strike her?"

Pilot Cannon—"That is what we came for. I am ready."

Engineer Toombs—"Let us go at her then; and do our best."

Fireman Sullivan—"I am with you all, and waiting. Go ahead."

The boat was now put bow on, and aimed directly for the *Ironsides*. As the little steamer darted forward, the look-out on the *Ironsides* hailed them with "Take care, there; you will run into us. What steamer is that?" Lieut. Glassell replied by discharging one barrel at the Yankee sentinel, and tendering the gun to Pilot Cannon, told him there was another Yankee, pointing to one with his body half over the bulwarks, and asked Cannon to take care of him with the other barrel.

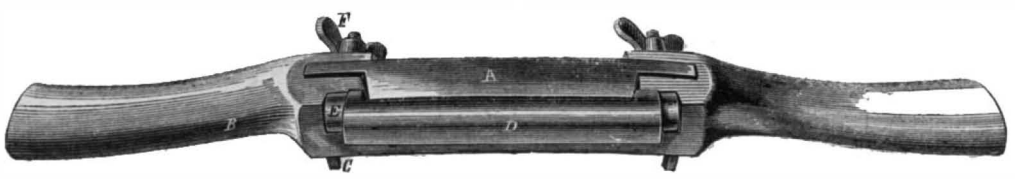
The next moment they had struck the *Ironsides*, and exploded the torpedo about fifteen feet from the keel, on the starboard side. An immense volume of water was thrown up, covering our little boat, and going through the smoke-stack, entered the furnace, completely extinguishing the fire.

In addition to this, pieces of the ballast had fallen in the works of the engine, rendering it unmanageable at that time. Volley after volley of musketry from the crew of the *Ironsides* and from the launches began to pour in upon them. Lieut. Glassell gave the order to back, but it was found impossible. In this condition, with no shelter, and no hope of escape, they thought it best to surrender and hailed the enemy to that effect. The Yankees, however, paid no attention to the call, but barbarously continued to fire. It was then proposed to put on their life-preservers, jump overboard and endeavor to swim to the shore. All but Pilot Cannon consented. The latter, being unable to swim, said he would stay and take his chances in the boat. Lieut. Glassell, Engineer Toombs, and Sullivan the fireman, left the boat, the two first having on life-preservers, and the latter supporting himself on one of the hatches thrown to him by the pilot. Engineer Toombs becoming embarrassed with his clothing in the water, got back to the boat and was assisted in by Cannon. The boat was then rapidly drifting from the *Ironsides*. He now fortunately found a match, and lighting a torch, crept back to the engine, discovered and removed the cause of its not working, and soon got it in order. Engineer Toombs and Cannon reached their wharf in the city about midnight, fatigued, and presenting a worn-out appearance, but rejoicing at their fortunate and narrow escape."

Lieutenant Glassell is now in this city under lock and key, and will not, therefore, be likely to engage in any more enterprises of a similar kind. Rafts have been placed around the *New Ironsides* to protect her against any attempts similar to the above.

Improved Spoke-shave.

There are a great many improvements of a simple nature which might be made in the tools and implements used by mechanics, and it only requires a little thought to discover them; such inventions are generally the source of a quick and profitable return to their authors. The accompanying engraving represents an improved spoke-shave, and the attachment to this tool is really a very neat and effective one. Every person who has had occasion to use the old-fashioned spoke-shave must have remarked the annoyance and difficulty arising from altering the "bite" of the knife from a rank to a fine chip, or the reverse. Ordinarily the knife has two tangs on it which are merely driven into holes in the handle, the friction of the tangs being all that retains the knife in place. When the cut is to be altered, it can only be done by driving the knife out. This is both inconvenient and clumsy, and the plan represented in the engraving is a much neater and better one. The knife, A, is fixed in the handle, B, and has two tangs, C, which enter the same. The cam, D, has its ends carried in the eye bolts, E, which terminate in thumb screws, F, on the further side from the reader. It will be seen that as the cam is turned toward the knife, the larger part rises and closes the throat of the same, thereby lessening its hold upon the wood to be cut, thus effecting the change from fine to heavy work very easily. The thumb-screws hold the cam firmly in place; and there is no necessity for moving the knife itself, except to grind or whet it. This invention was patented on June 25, 1861, by Martin Colton, of Sardinia, N. Y.; for further information address George Parr, Tool maker, Buffalo, N. Y.



COLTON'S PATENT SPOKE-SHAVE.

SPECIAL NOTICE.—John Turnbull, of Baltimore, Md., and James Sinsbury, of Conn., have petitioned for the extension of a patent granted them on Jan. 29, 1850, for an improvement in looms for weaving piled fabrics. It is ordered that the said case be heard at the Patent Office, Washington, on Monday, Jan. 11, 1864. All persons interested are required to appear and show cause why said petition should not be granted.

MORE ABOUT FRENCH IRON-CLADS.—The discussion on the late trial of cuirassed steamers off the French coast has at last brought the principal results to light. They may be summed up as follows:—All of the vessels which were armed and plated sufficiently to constitute them formidable modern vessels of war, were shown to be unsafe seaboats for all weathers; while two of the vessels, which were too lightly armed and plated to be classed as first-class war vessels, showed themselves sufficiently good boats for a long voyage in all weathers. Thus the French Government possesses but two cuirassed ships which may be deemed as capable in all weathers of making the voyage as armed men-of-war to America, and these two are so lightly armed and cuirassed as not to be able to resist for five minutes one of the little monitors.

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